

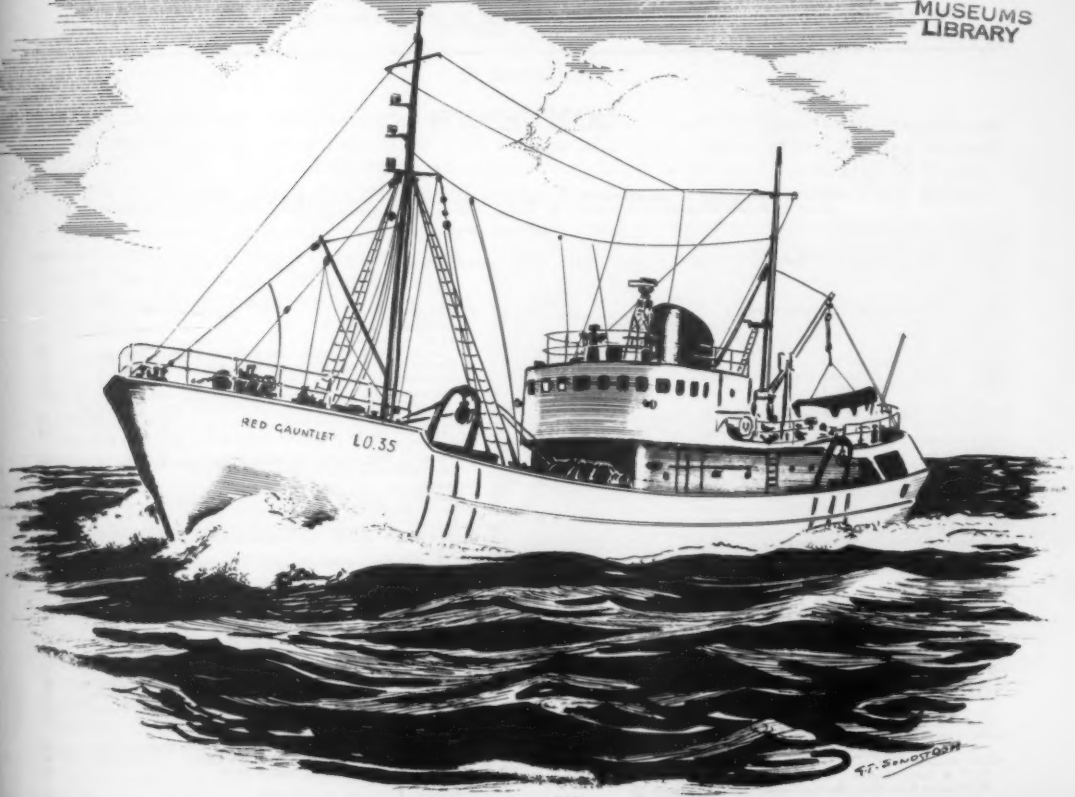
REV. OF FISHERIES

COMMERCIAL FISHERIES REVIEW

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COMMERCIAL FISHERIES REVIEW



A review of developments and news of the fishery industries
prepared in the BRANCH OF COMMERCIAL FISHERIES

A. W. Anderson, Editor

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Mailed free to members of the fishery and allied industries. Address correspondence and requests to the: Director, Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C.

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NORTH PACIFIC ALBACORE TUNA EXPLORATION BY THE M/V JOHN N. COBB--1956

By Donald E. Powell*

SUMMARY

Albacore tuna were found to be widely distributed off the coasts of Oregon and Washington during the summer of 1956 by the Service's exploratory fishing vessel John N. Cobb. Operations were coordinated closely with the University of Washington's oceanographic vessel Brown Bear. The John N. Cobb explored the waters of the northeastern Pacific Ocean from northern California to southern British Columbia, extending out more than 800 miles offshore, fishing with gill nets and albacore trolling gear.

First albacore were caught in a gill net set on July 20, and subsequent catches indicated that the albacore were scattered over a wide area, but no evidence of offshore schooling was found. Several salmon were taken in the gill nets along 50° N. latitude, but no albacore were taken north of 49° N. latitude.

Following the early albacore catches made by the John N. Cobb and the Brown Bear, several commercial fishing vessels began trolling near the Oregon coast in mid-August and immediately reported good catches of albacore. A fleet of over 100 vessels found good fishing all along the Oregon coast through September, and nearly 4 million pounds of albacore were landed in Oregon ports. This was the first year since 1950 that sizable catches of albacore were made north of California.



FIG. 1 - THE HIGH-SEAS GILL NETS WERE HAULED OVER THE BOW OF THE JOHN N. COBB. FISH IN THE NET IS A BLUE SHARK.

INTRODUCTION

Exploration to determine distribution and availability of albacore tuna in a section of the northeastern Pacific Ocean from northern California to Southern British Columbia was carried out aboard the U. S. Fish and Wildlife Service's exploratory fishing vessel John N. Cobb during the summer of 1956. Offshore fishing was conducted over a seven-week period, from July 16 to August 30, extending out more than 800 miles off the coasts of Oregon and Washington. At the same time, information on high-seas salmon distribution in the area, particularly data on their apparent southern range at that time of year, was obtained for the Service's salmon research program under the International North Pacific Fisheries Commission.

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The work was coordinated with simultaneous cruises of several other research vessels. The University of Washington's oceanographic vessel Brown Bear, participating with the Oregon Fish Commission, operated closely with the John N. Cobb

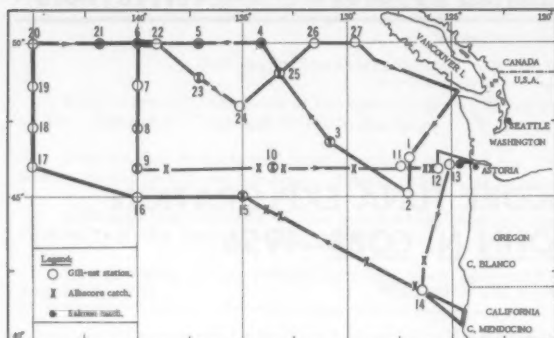


FIG. 2 - TRACK LINE OF THE JOHN N. COBB, SHOWING GILL-NET STATIONS (NUMBERED 1-27) AND ALBACORE AND SALMON CATCHES.

much of the time (Frolander and Lincoln 1956, and Homberg 1956). High-seas salmon research vessels covered the waters to the north and west of where the two vessels operated, and the John R. Manning from the Pacific Oceanic Fisheries Investigations in Hawaii conducted albacore research west of 145° W. longitude (Anonymous 1956). Oceanographic and biological data collected are currently being analyzed by agencies engaged in albacore and salmon research in this area.

limit of salmon distribution coincided roughly with the northern limit of albacore during the summer months. In the northeastern Pacific this dividing line, with some overlapping, appeared to lie between 45° N. and 50° N. latitude. It was found during those investigations that high-seas gill nets designed to catch salmon were also effective in catching albacore. Accordingly, one of the John N. Cobb's 1956 objectives was to obtain further information on the northern distribution of albacore and the southern distribution of salmon between 40° N. and 50° N. latitude, from the Pacific Coast to 145° W. longitude, fishing with gill nets and albacore trolling gear.

CRUISE PLAN

Information obtained by the high-seas salmon research vessels in 1955 indicated that the southern limit of salmon distribution coincided roughly with the northern limit of albacore during the summer months. In the northeastern Pacific this dividing line, with some overlapping, appeared to lie between 45° N. and 50° N. latitude. It was found during those investigations that high-seas gill nets designed to catch salmon were also effective in catching albacore. Accordingly, one of the John N. Cobb's 1956 objectives was to obtain further information on the northern distribution of albacore and the southern distribution of salmon between 40° N. and 50° N. latitude, from the Pacific Coast to 145° W. longitude, fishing with gill nets and albacore trolling gear.

To assure adequate coverage of the working area in the time scheduled, the cruise plan of the John N. Cobb was laid out with 27 gill-net stations to be occupied in sequence on successive nights, or on alternate nights where distances required two days' running time (see fig. 2). Standard commercial albacore trolling gear was fished during daylight hours while running between stations. Cruise tracks were planned so that the Brown Bear would occupy concurrent all-night oceanographic stations at several of the John N. Cobb's gill-net stations. At other times the vessels took separate courses but arranged to exchange fishing and oceanographic data several times daily by radio. A port call was scheduled in the middle of the cruise for refueling and taking on supplies at Astoria, Ore.

Arrangements were made for the research vessels to keep in radio contact with the trolling fleets of Oregon and Washington to relay information on any significant catches of albacore, especially catches close enough to shore for possible commercial fishing.

A biologist from the Pacific Salmon Investigations staff was assigned to the John N. Cobb to collect data on lengths, weights, stomach contents, etc., of all fish caught and to tag albacore which were landed in good condition. All albacore which were not tagged and released, all salmon, and samples of other species were frozen for future laboratory inspection. The University of Washington furnished oceanographers to make routine observations and collections aboard the John N. Cobb, including sea-water samples, bathythermograph casts, and plankton collections. More comprehensive oceanographic work was done by the Brown Bear, which also fished albacore trolling gear between stations.

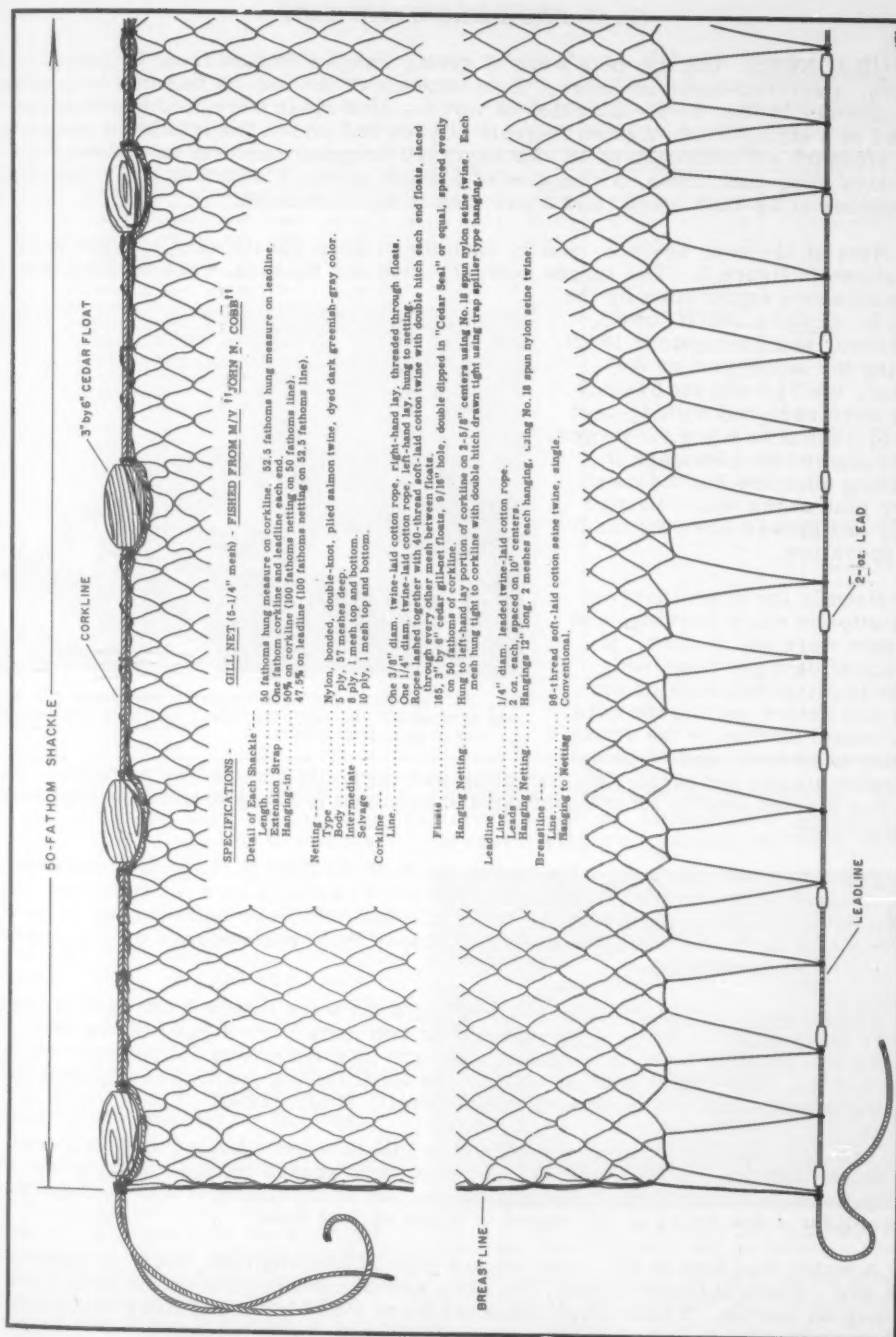


FIG. 3 - DIAGRAM OF GILL NET RIGGED FOR HIGH-SEAS FISHING.

GEAR AND FISHING METHODS

GILL NETS: The gill nets were of nylon, ranging in size from $3\frac{1}{4}$ inches to $8\frac{1}{2}$ inches, stretched-mesh measure. Each shackle of net was 50 fathoms long and approximately 20 feet deep. Shackles of various size mesh were tied together and fished in a string with a lighted flagpole at each end and in the middle of the string. The standard set consisted of 18 shackles (900 fathoms) made up as follows: 3 shackles of $3\frac{1}{4}$ -inch mesh, 5 shackles of $4\frac{1}{2}$ -inch mesh, 6 shackles of $5\frac{1}{4}$ -inch mesh, 2 shackles of $7\frac{1}{2}$ -inch mesh, and 2 shackles of $8\frac{1}{2}$ -inch mesh.

Nets of $3\frac{1}{4}$ -inch, $4\frac{1}{2}$ -inch, and $5\frac{1}{4}$ -inch mesh were constructed similar to the net shown in figure 3. The larger nets, $7\frac{1}{2}$ -inch and $8\frac{1}{2}$ -inch, were used successfully in albacore exploration by the John N. Cobb in 1950 (Powell, Alverson, and Livingstone 1952). During the latter part of the cruise, the $7\frac{1}{2}$ -inch and $8\frac{1}{2}$ -inch nets were replaced with $4\frac{1}{2}$ -inch and $5\frac{1}{4}$ -inch nets since the larger sizes showed no advantage in catching albacore but did catch more blue shark which tangled badly and slowed down the hauling operation.

Usually the vessel arrived on station in early evening, and the nets were set at dusk. If sufficient daylight remained, some trolling was done on station just before setting the nets. The vessel held on to the string of nets downwind, and the oceanographic station and night-light sampling was normally finished by midnight. Hauling was started shortly after daybreak and required from $1\frac{1}{2}$ to 2 hours depending on the catch.

The nets were set from a bin on the stern of the John N. Cobb and were hauled over the bow with a hydraulic gurdie. Fish were removed on a plywood table between the rail and the gurdie on the bow while the nets were being pulled to the stern for re-stacking in the bin. The crew performed daily maintenance on the nets while trolling between stations.

ALBACORE TROLLING: Three trolling lines were fished from each of two outrigger poles on the John N. Cobb and one or two lines were rigged on the stern. Feathered, plastic, bone, and rubber albacore jigs of various colors were tried, all standard commercial gear as used in the local fishing fleet. Gear makeup and rigging was similar to that described by Powell, et al., 1952.

Trolling was started each day after the gill nets were hauled and the vessel was under way for the next station. Stations were spaced to allow an average trolling speed of 6-7 knots during daylight hours, but occasionally it was necessary to proceed for a few hours at full speed to make up lost time.

A watch was kept at all times for any sign of jumping fish, feed, or other marine life. When albacore struck, the area was circled several times before proceeding on course. Troll-caught albacore were landed in a box lined with foam rubber so that those in good condition could be tagged and released.



FIG. 4 - THE GILL NETS WERE PILED IN THE STERN BIN READY FOR SETTING AT THE NEXT STATION. THE SAIL WAS USED ONLY FOR STABILIZING EFFECT.

CATCH RESULTS

ALBACORE: The first albacore were caught by the John N. Cobb in a gill net set on July 20 near the Cobb seamount which lies about 270 miles west of Grays Harbor, Wash. (see fig. 2 and table 1). From then until August 1, several other gill net catches and trolling catches showed that albacore were widely distributed off

Table 1 - Gill-Net Catch Data-M/V John N. Cobb--Cruise 25--July 18 to August 30, 1956

Station No.	Date ^{1/}	Position of Set		Surface Temperature	Wind Direction and Force ^{2/}	Fathoms of Net	No. Hours Soaked ^{3/}	Number Salmon Caught			Number Albacore Caught	Number Incidental Catch					
		Latitude N.	Longitude W.					Red	Silver	Total		Blue Shark	Jack Mackerel	Pomfret	Squid	Other	
1	7/21 - 7/23	16°12'N	126°59'W	64.5°F.	SW-4	900	41	0	0	0	0	0	9	0	1	1 brown ragfish	
2	7/23 - 7/25	16°05'N	126°56'W	64.1°F.	SW-5-7	900	0	0	0	0	0	3	0	0	0	0	
3	7/25 - 7/25	16°05'N	126°42'W	59.0°F.	SW-4 - SW-7	900	41	0	0	0	2	11	17	3	0	0	
4	7/25 - 7/25	16°05'N	125°59'W	56.0°F.	SW-4	900	9	0	0	0	0	0	0	33	0	1 steelhead trout	
5	7/25 - 7/25	16°05'N	125°59'W	55.0°F.	SW-5	900	0	0	1	5	0	0	0	43	5	0	
6	7/25 - 7/25	16°05'N	126°00'W	55.0°F.	SW-4	900	41	1	0	1	0	0	5	206	2	0	
7	7/25 - 7/26	16°16'N	126°00'W	56.0°F.	SW-5	900	41	0	0	0	0	1	5	27	0	0	
8	7/26 - 7/27	16°20'N	126°05'W	55.5°F.	SW-4	900	54	0	0	0	7	5	0	13	0	0	
9	7/27 - 7/28	16°00'N	126°00'W	56.0°F.	SW-2	900	0	0	0	0	0	6	0	0	0	0	
10	7/29 - 7/30	16°00'N	125°30'W	56.0°F.	SW-4	900	41	0	0	0	9	0	0	44	30	0	
11	7/31 - 8/1	16°00'N	125°28'W	61.0°F.	SW-4-5	900	0	0	0	0	0	0	0	1	0	0	
12	8/1 - 8/1	15°58'N	125°48'W	61.0°F.	SW-6	900	10	0	0	0	0	11	1	0	0	0	
13	8/5 - 8/7	16°12'N	125°13'W	66.5°F.	SW-4	900	41	0	0	0	0	15	0	0	0	0	1 mackerel shark, 2 makoish
14	8/8 - 8/9	14°50'N	126°58'W	61.0°F.	SW-4-7	1500	41	0	0	0	0	4	0	0	0	0	
15	8/14 - 8/15	15°00'N	125°00'W	65.0°F.	SW-4	900	10	0	0	0	3	0	0	0	0	0	
16	8/16 - 8/17	16°00'N	126°00'W	60.0°F.	SW-4-7	900	10	0	0	0	0	10	0	7	7	0	
17	8/18 - 8/19	16°00'N	126°00'W	59.0°F.	SW-4	600	10	0	0	0	0	7	0	0	0	0	
18	8/19 - 8/20	15°00'N	126°00'W	57.5°F.	SW-4	900	10	0	0	0	0	33	0	1	5	0	
19	8/20 - 8/21	16°16'N	126°00'W	56.5°F.	SW-4	900	11	0	0	0	0	37	3	9	1	0	
20	8/21 - 8/22	16°00'N	126°00'W	56.5°F.	SW-4	900	10	0	0	0	0	3	0	0	0	0	
21	8/22 - 8/23	16°00'N	126°16'W	56.0°F.	SW-5	900	10	0	1	1	0	4	57	50	13	1 giant killifish, 1 mackerel shark	
22	8/23 - 8/24	16°00'N	126°00'W	56.5°F.	SW-5	900	11	0	0	0	0	3	76	48	43	1 giant killifish	
23	8/24 - 8/25	16°00'N	125°00'W	59.0°F.	SW-4	900	10	0	0	0	1	9	38	5	5	0	
24	8/25 - 8/26	16°00'N	125°10'W	61.5°F.	SW-4	900	10	0	0	0	0	19	140	88	6	0	
25	8/26 - 8/27	16°00'N	125°11'W	61.0°F.	SW-5	900	10	0	0	0	1	10	31	88	0	0	
26	8/27 - 8/28	16°00'N	125°11'W	61.0°F.	SW-5	900	10	0	0	0	0	13	0	0	0	0	
27	8/28 - 8/29	16°00'N	126°00'W	61.5°F.	SW-5 - SW-4	900	10	0	0	0	0	0	0	0	0	0	
TOTALS							850	9	0	7	85	405	497	647	288		

^{1/} All gill-net sets were made at night

^{2/} Wind force is according to Beaufort scale

^{3/} Does not include setting and hauling time

Washington and Oregon out to 140° W. longitude, over 600 miles offshore. During August albacore were also taken as far south as 42° N. latitude near station 14 off northern California and at several of the more offshore stations, but none were caught north of 49° N. latitude.

Although the fishing revealed a wide distribution of albacore, individual catches were small during the entire cruise. A total of 38 albacore were taken on trolling gear and 25 in the gill nets. In addition, 13 observed albacore were lost after striking the trolling gear, and several were seen to fall out of the small-mesh nets during hauling.

Best catches of albacore were made on July 29 when 9 were taken on trolling gear near 46° N., 134°10' W., and nine were caught that night in a gill-net set some 20 miles eastward. Seven more albacore were taken trolling the next morning along the same track line. On August 1, three albacore were caught approximately 80 to 100 miles off the Columbia River on the trolling gear.

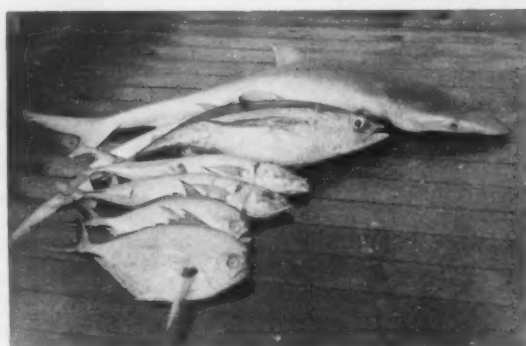


FIG. 5 - BLUE SHARK, ALBACORE, JACK MACKEREL, AND POMFRET FROM ONE OF THE GILL-NET CATCHES.

The consistently small catches indicated that the albacore were widely scattered and not in large schools in the offshore waters. This was supported by the fact

that no sizable schools were sighted at any time during the cruise. Only occasional jumpers, from one to a few fish, were seen.

Table 2 - Albacore Troll Catch Data--M/V John N. Cobb--Cruise 88--July 16 to August 30, 1958

Date	Position Latitude N., Longitude W.	Time of Day	Surface Temperature	Wind Direction and Force	Number Albacore Caught	Strikes, Fish Lost
7/27	47°13' 140°00'	0900	96° F.	SW-3	1	
"	46°00' 140°00'	2030	98° F.	SE-2	2	2
7/28	46°06' 138°40'	1815	98.5° F.	SE-4	1	1
7/29	46°00' 136°10'	1630-1830	98° F.	SW-4	9	
7/30	46°00' 133°00'	1030-1210	98° F.	SW-4	7	1
7/31	46°06' 129°40'	0825	60° F.	SW-4	1	
8/1	45°57' 126°25'	1340	61° F.	SW-5	1	1
"	45°58' 125°40'	1730	61° F.	SW-5	2	
8/8	42°55' 126°25'	1054	60.5° F.	SW-7	1	
"	42°00' 126°36'	2000	60.5° F.	SW-7	4	
8/12	42°14' 126°26'	1630-1740	59° F.	SW-4	-	4
8/13	42°56' 128°56'	0610	62° F.	S-4	2	2
8/14	44°20' 133°06'	0610	63° F.	SW-3	2	
"	44°36' 133°48'	1050	65° F.	SW-3	3	
8/15	44°58' 135°30'	1150	62.5° F.	SW-10	1	2
8/26	48°29' 134°27'	1300	61° F.	SW-5	1	
Total					38	13

1/ WIND FORCE IS ACCORDING TO NEAPORT SCALE.

consisting of 5 red salmon and 2 silver salmon. One steelhead trout was taken along with two red salmon in the gill nets on July 22 at 50°01' N., 133°58' W.

No salmon were taken south of 50° N. latitude except for one silver salmon which struck the albacore trolling gear 20 miles off the Columbia River on August 6.

INCIDENTAL GILL-NET CATCH: Several species of pelagic fish far outnumbered the catch of albacore in the gill nets (see table 1). A total of 667 pomfret, 497 jack mackerel, and 225 blue shark were landed. In addition, 199 large squid (2-3 feet in length) were also taken in the nets. All these species were found widely distributed over the fishing area, blue shark being present in all but two of the gill-net catches.

Up to 206 pomfret, 148 jack mackerel, 97 squid, and 31 blue shark were taken in individual gill-net catches. Blue shark were in every catch containing albacore, and jack mackerel and pomfret were in all but one.

Other incidental fish caught in the nets were brown ragfish, mackerel shark, sablefish, and giant skilfish. One of the giant skilfish was kept alive aboard the John N. Cobb for eight days until the end of the trip, when it was transferred to the University of Washington School of Fisheries aquarium where it is still alive and growing.

NIGHT-LIGHT FISHING: After the gill nets were set each evening and the oceanographic station completed, night-light fishing with small-mesh dip nets was carried on for an hour or two usually between 9 p.m. and midnight. A 1,000-watt underwater diving light was suspended just beneath the surface to attract the small feed. On several occasions in choppy seas the 500-watt boom light suspended about six feet above the water was also used. Samples of specimens caught were preserved, and each station was classified as "poor," "fair," or "rich," depending on



FIG. 6 - PORTION OF A GILL-NET CATCH INCLUDING MACKEREL SHARK, BLUE SHARK, POMFRET, JACK MACKEREL, AND SQUID.

the relative numbers of fish and squid observed. No effective night-lighting was done at four gill-net stations because of poor weather conditions.

Saury, from 1½ inches to 12 inches in length, were the most abundant feed species observed. Squid and lanternfish were also quite common. The plankton hauls were preserved for later analysis at the University of Washington Department of Oceanography.

Saury were present at 22 of the 23 stations, squid at 15, and lanternfish at 10. Squid were the most difficult to catch in the dip nets, but it was usually possible to capture enough for a sample. At one station several large squid were speared. Saury and lanternfish were caught quite easily, especially at the richer stations. Seven stations were classified as "poor," eight as "fair," and eight as "rich."

Analysis of the night-light fishing results showed a correlation with the catch of albacore in the gill nets. At 7 stations rated as "poor" for night-light fishing only one albacore was taken, at 8 stations rated as "fair" only two albacore were taken, and at 8 stations rated as "rich" 19 albacore were taken.

In addition to the plankton samples taken at each oceanographic station, other floating organisms were observed and collected. Velella (purple-sail jellyfish) were seen in vast numbers over large areas, sometimes for several days running. Floating goose barnacles were also abundant at times, as were salps and round white jellyfish.

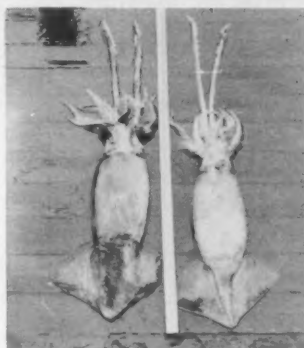


FIG. 7 - TWO OF THE LARGE SQUID, APPROXIMATELY THREE FEET IN LENGTH, WHICH WERE TAKEN IN SEVERAL GILL-NET CATCHES.

SIZE OF ALBACORE

Albacore caught by the John N. Cobb ranged in size from 50 cm. (19.7 inches) to 78 cm. (30.7 inches), and from 5.5 pounds to 20.5 pounds. The gill-net caught fish averaged 67 cm. (26.4 inches) and 14.5 pounds as compared to 64.5 cm. (25.4 inches) and 12.2 pounds for the troll-caught fish. The over-all average was 65.5 cm. (25.8 inches) and 13.4 pounds. These figures include lengths for 62 albacore and weights for 43 albacore.

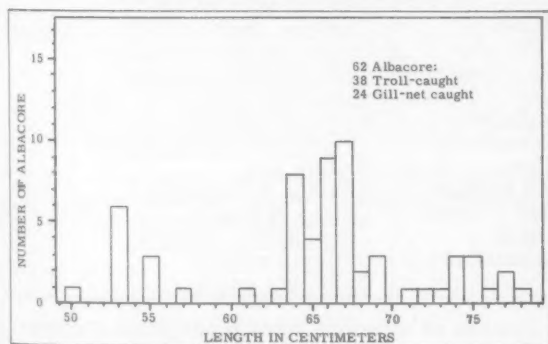


FIG. 8 - LENGTH-FREQUENCIES FOR 62 ALBACORE CAUGHT BY THE JOHN N. COBB.

group. It is possible that the size groups represent three age classes, but the total number of measurements is probably too small for any such conclusions to be drawn.

WATER TEMPERATURE IN RELATION TO CATCH

Table 3 shows that catch of albacore and salmon in relation to surface water temperature. Salmon were caught in water from 54° F. to 58° F. Albacore were taken at temperatures ranging from 55.5° F. to 63° F. The area of overlapping

catches was from 55.5° to 58° F., but in general salmon were caught in waters colder than 57° F. and albacore were caught in waters warmer than 57° F.

Table 3 - Surface-Water Temperature for Albacore and Salmon Catches

Surface Temperature	Salmon Gill Net	Albacore Gill Net	Albacore Troll
°F.	No.	No.	No.
54	1		
54.5			
55	3		
55.5		7	
56	2		1
56.5			
57			
57.5			
58	1	11	21
58.5			2
59		3	4
59.5			
60			1
60.5			5
61		1	5
61.5			
62			4
62.5			3
63		3	5
Total	7	25	1/51

1/ INCLUDES 13 TROLLING STRIKES WHERE THE ALBACORE WERE LOST BEFORE LANDING.

Best albacore catches were made in 58° F. water with trolling gear. Only one troll-caught albacore was taken in colder water. Again the total catch was too small for any significant analysis of catch-temperature relationship.

COMMERCIAL FISHERY DEVELOPMENT

Following the early reports of offshore albacore catches made in late July and early August by the John N. Cobb and the Brown Bear, several commercial fishing vessels rigged with albacore trolling gear began fishing along the Oregon coast in mid-August. First commercial catches were reported by the Kiska, Betty, and Nel on August 18 fishing 70 to 100 miles off the central Oregon coast. Other vessels entered the fishery immediately and by August 24 it was reported that 150 vessels were moving into the albacore fishing area.

fishing all along the Oregon coast through September, with daily catches up to 700 and 800 fish reported by the more successful vessels. Price disputes slowed fishing somewhat during late September, and by early October the fleet had mostly dispersed with the regular albacore trollers heading for still-productive grounds off California.

Total landings of albacore by the fleet in Oregon ports amounted to nearly four million pounds and these probably would have been larger but for the price disputes. This was the first year since 1950 that sizable catches of albacore were made north California. Whether it signifies a return to the Pacific Northwest coast of the unpredictable white-meat tuna after several years of absence is a matter of conjecture. Surely there is not sufficient scientific evidence available at this time on which to base any prediction.

Table 4 - List of Common and Scientific Names of Fish Used in This Report

Albacore	<u>Thunnus germon</u> (or <u>T. alalunga</u>)
Red salmon . .	<u>Oncorhynchus nerka</u>
Silver salmon .	<u>Oncorhynchus kisutch</u>
Steelhead trout .	<u>Salmo gairdnerii</u>
Blue shark . . .	<u>Prionace glauca</u>
Jack mackerel .	<u>Trachurus symmetricus</u>
Pomfret.	<u>Brama raii</u>
Brown ragfish .	<u>Acrotus willoughbyi</u>
Mackerel shark	<u>Lamna ditropis</u>
Sablefish	<u>Anoplopoma fimbria</u>
Giant skilfish. .	<u>Erilepis zonifer</u>
Saury	<u>Cololabis saira</u>

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CREAM OF CRAB SOUP FOR A SUMMER LUNCHEON

Cream of crab soup is a "natural" in the summer since crab meat is plentiful at that time. It is nutritious and delicious and an easy-to-prepare hot meal for our cooler summer days. Crab soup has been a favorite of Marylanders for years.



Crab soup can be prepared by using cooked crab meat from hard shell crabs packed in cans and marketed fresh, frozen, or canned. The four principal species that supply the crab meat are the blue, Dungeness king, and rock crabs. The meat from these crabs can be used interchangeably in most recipes.

The home economists of the United States Fish and Wildlife Service suggest that you serve "Cream of Crab Soup" with crunchy crackers and a crisp vegetable salad.

CREAM OF CRAB SOUP

1 POUND CRAB MEAT	$\frac{1}{4}$ TEASPOON CELERY SALT
1 CHICKEN BOUILLON CUBE	1 TEASPOON SALT
1 CUP BOILING WATER	DASH PEPPER
$\frac{1}{4}$ CUP CHOPPED ONION	1 QUART MILK
$\frac{1}{4}$ CUP BUTTER OR OTHER FAT, MELTED	CHOPPED PARSLEY
3 TABLESPOONS FLOUR.	

Remove any shell or cartilage from crab meat. Dissolve bouillon cube in water. Cook onion in butter until tender. Blend in flour and seasonings. Add milk and bouillon gradually; cook until thick, stirring constantly. Add crab meat; heat. Garnish with parsley sprinkled over the top. Serves 6.



COLD STORAGE OF FROZEN PACIFIC OYSTERS (*CRASSOSTREA GIGAS*)^{1/}

No. 2 - Effect of Antioxidant and Other Treatments on Keeping Quality

INTRODUCTION

The frozen-oyster industry of the Pacific Coast is the result of efforts on the part of producers and packers to broaden the market. In some cases the oysters are the excess from the fresh market and have been held at above freezing temperatures for several days before being frozen. Many packers are troubled by an occasional lack of uniformity and good quality in their product after frozen storage. Through the Pacific Coast Oyster Growers Association, they requested that experimental work be carried out to help improve the quality of frozen Pacific Oysters.

A study of the problems concerned with the frozen storage of Pacific oysters has been in progress at the Seattle Technological Laboratory since October 1954.

The initial paper^{2/} reported results of a series of exploratory tests designed to determine what factors contribute to the formation of excessive drip in frozen oysters. Of the factors investigated, only the length of blowing time had materially affected drip. The work was limited to oysters frozen for only short periods of time. Commercial samples of frozen oysters always released considerably more drip than did the experimentally-frozen oysters. These differences in drip may have been caused by the greater length of time the commercial samples had been frozen.

Pacific oysters are usually frozen in 10-ounce eastern oyster cans. This procedure leads to some lack of uniformity in the product since Pacific oysters are often quite large and relatively few will fit into this size can.

Pacific oysters are frozen either raw or after blanching. The latter consists of immersing the oysters in boiling water for about one minute. The purpose is to firm the oyster meats and to overcome the natural slippery feel of the oyster which many homemakers find distasteful.

Certain physical and chemical changes take place in oysters during frozen storage. The body of the oyster darkens gradually and the oysters exposed to the head-space of the can become yellow. The oyster loses some of its firmness and becomes flaccid. The dark pigment from the mantle sloughs off and causes the drip to have a slightly sooty appearance.

While these changes are taking place, a change in flavor also develops. The normal fresh oyster flavor disappears and strong bitter off-flavors develop after extended storage.

^{1/} THIS WORK WAS CARRIED OUT UNDER A PROJECT FINANCED IN PART BY THE REFRIGERATION RESEARCH FOUNDATION.

^{2/} THE INITIAL REPORT, "COLD STORAGE OF FROZEN PACIFIC OYSTERS (*CRASSOSTREA GIGAS*)--NO. 1" WAS PUBLISHED IN THE DECEMBER 1955 (P. 11) ISSUE OF COMMERCIAL FISHERIES REVIEW.

The continuing aim of the present experimental work on frozen Pacific oysters is to slow down or prevent these changes so that (1) the quality of the frozen oysters is improved and (2) the marketing period is extended to a period of a year or longer.

The current phase of the project is concerned with an investigation of the effect of various processing treatments of the oysters before freezing on their storage characteristics. The treatments used include blanching, adding oxygen to the headspace, adding nitrogen to the headspace, and dipping the oysters into various anti-oxidant solutions.

EXPERIMENTAL

PREPARATION OF SAMPLES: The oysters used in these investigations were obtained from beds in the Willapa Bay area of Washington. They were obtained, freshly shucked and blown, from a commercial plant in South Bend, Wash.; placed in 5-gallon milk containers, packed in ice, and transported by truck to the Service's Seattle Fishery Technological Laboratory. The containers were held overnight in crushed ice, treated, and packed in 10-ounce oyster cans, sealed, and frozen the following day.

Approximately one-half of the oysters were blanched for one minute in boiling water and then drained before being treated and packed. The remaining oysters were treated and packed raw. Treatments consisted of dipping the oysters in solutions of the following antioxidants:

1. Antioxidant mixture^{3/} dissolved in U.S.P. propylene glycol^{4/}.
 - a. Nordihydroguaiaretic acid (NDGA) 0.01 percent by weight of oyster.
 - b. Beta hydroxyanisole (BHA)--0.02 percent by weight of oyster.
 - c. Ascorbic acid--0.02 percent by weight of oyster.
2. Ascorbic-citric acid mixture in water^{4/} (0.5 percent ascorbic acid--0.5 percent citric acid).

In addition to the antioxidants, the following treatments were included for control and comparison:

1. Control--no treatment.
2. Oxygen--air in headspace of can replaced by oxygen.
3. Nitrogen--air in headspace of can replaced by nitrogen.
4. Propylene glycol--for comparison with oysters treated with Tappel's^{3/} mixture.

The packaged oysters were frozen at -20° F. and stored at 0° F.

EXAMINATION OF SAMPLES: At two-month intervals over a period of 13 months, samples of the frozen oysters were removed from storage and examined.
^{3/} RECOMMENDED BY A. L. TAPPEL, UNIVERSITY OF CALIFORNIA, FOOD TECHNOLOGY DEPARTMENT, DAVIS, CALIF.
^{4/} ANTIOXIDANT PICK-UP WAS ASSUMED TO BE PROPORTIONAL TO THE PICK-UP OF THE SOLVENT. THIS WAS MEASURED PRIOR TO DISSOLUTION OF THE ANTIOXIDANTS.

$$\text{WT. \% ANTIOXIDANT DISSOLVED IN SOLVENT} = \frac{(\text{CONCENTRATION OF ANTIOXIDANT}) (\text{WT. OYSTERS})}{(\text{WT. SOLVENT ABSORBED PER WT. OYSTERS})}$$

A variety of tests were performed in order to follow any changes that might be taking place. The following determinations were made on the thawed oysters: (1) pH, (2) free drip, (3) expressible drip, and (4) organoleptic evaluation (odor, appearance, and flavor).

The pH of the oysters was determined by measuring the pH of a blended sample by means of a glass electrode pH meter.

Free drip and expressible drip measurements were made on samples of the oysters that had been thawed 16 hours at 34° F. Free drip is defined as the weight of liquid lost in terms of percentage of initial product weight, during exactly two minutes of draining on a standard number 4 brass screen. Expressible drip is the percentage weight of liquid lost during exactly two minutes of compression between two layers of plastic sponges. The expressible drip measurements were made after the free drip was released.

Organoleptic evaluations of flavor were made by the investigators and by a taste panel which consisted of students and staff from the fisheries center at the University of Washington. Each panel consisted of from 8 to 16 people.

The oyster samples were presented to the tasters in the form of a standard oyster stew that consisted of chopped oysters, grade A butter, fresh milk, and salt. All samples of stew were prepared simultaneously. Temperatures were maintained by the use of double boilers containing hot water in the lower part during each taste-test period, which varied from 30 to 45 minutes.

For each examination a sample of fresh oysters was obtained and used in a stew as a reference sample. The reference stew was automatically given the highest score possible. All experimental oyster stews were judged in relation to the known and plainly labeled reference.

The score card used was based on a 10-point scale with 7-10 indicating good quality; 5-6, fair quality; and 1-4, poor quality. The tasters were asked to assign appropriate numbers to each sample. The reference sample was always arbitrarily assigned the score of 10.

General observations of the samples were made by the authors at each examination. These included a comparison of the odor, appearance, and the color of the surface of the oyster exposed to the headspace of the can.

RESULTS

There were no significant differences noted between any of the samples at the two- and four-month examinations of the samples. After six months, the oyster surfaces exposed to the headspace in all of the cans had begun to turn yellow in color. No off-odors were noted at this time. There were slight rancid odors detected in all samples after they had been stored for eight months. These odors were especially noticeable in the discolored areas.

After thirteen months of storage at 0° F. all of the samples were found to be of poor acceptability. The surfaces exposed to the headspace of the cans were discolored, the oysters did not have the firmness generally found in fresh oysters, and the body sections of many of the oysters had darkened. The discoloration on the surfaces exposed in the headspace of the can was the most important factor contributing to the poor appearance. Rancid odors were generally detected in product's surface areas. The blanched samples showed a tendency to shrink and to become shriveled. The results of the general observations made after various storage periods are presented in table 1.

There were variations in the drip values between the individual samples of as much as 30 percent. This variation was caused mostly by the differences in the amount of excess liquid in the cans at the time of packing; however, variation in the size of the oysters and the number of oysters in the cans also contributed to the

Table 1 - Results of General Observations of Frozen Pacific Oysters Stored at 0° F.

Oyster Treatment	Observations								
	After 4 Months of Storage			After 8 Months of Storage			After 13 Months of Storage		
	Acceptability ^{1/}	Odor	Surface Color ^{2/}	Acceptability ^{1/}	Odor	Surface Color ^{2/}	Acceptability ^{1/}	Odor	Surface Color ^{2/}
Raw									
Control	Good	Normal	Normal	Fair	Very slightly rancid	Yellow	Fair	Slightly rancid	Yellow
Oxygen in headspace of can	Good	Normal	Normal	Poor	Very slightly rancid	Yellow-green	Unacceptable	Rancid	Yellow
Nitrogen in headspace of can	Good	Normal	Normal	Poor	Very slightly rancid	Dark yellow	Poor	Very slightly rancid	Yellow
Dipped 30 seconds in U.S.P. propylene glycol	Good	Normal	Normal	Poor	Very slightly rancid	Yellow-green	Poor	Slightly rancid	Yellow
Dipped 30 seconds in anti-oxidant mixture	Good	Normal	Normal	Fair	Normal	Red-brown	Fair	Slightly rancid	Yellow-brown
Dipped 30 seconds in ascorbic acid-citric acid mixture	Fair ^{3/}	Normal	Normal	Poor ^{3/}	Very slightly rancid	Yellow-green	Poor ^{3/}	Slightly rancid	Yellow-brown
Blanched									
Control	Fair	Normal	Slightly yellow	Poor	Slightly rancid	Yellow-green	Unacceptable	Rancid	Yellow-green
Oxygen in headspace of can	Good	Normal	Normal	Poor	Slightly rancid	Gray	Unacceptable	Rancid	Yellow
Nitrogen in headspace of can	Good	Normal	Normal	Poor	Very slightly rancid	Yellow-green	Poor	Slightly rancid	Yellow
Dipped 30 seconds in anti-oxidant mixture	Good	Normal	Normal	Fair	Slightly rancid	Yellow	Fair	Slightly rancid	Yellow-brown
Dipped 30 seconds in ascorbic acid-citric acid mixture	Fair ^{3/}	Normal	Normal	Poor ^{3/}	Slightly rancid	Yellow-green	Poor ^{3/}	Very slightly rancid	Yellow

^{1/} ACCEPTABILITY NOT BASED ON FLAVOR OF ANY OF THE SAMPLES.

^{2/} SURFACE COLOR--THE COLOR OF THE OYSTER SURFACE EXPOSED TO THE HEADSPACE OF THE CAN.

^{3/} RATING DOWN-GRADED BECAUSE OF WHITE APPEARANCE OF FREE LIQUID.

drip variation. The expressible drip values were more consistent than the free drip values because the excess liquid was removed before expressible drip was measured. There were no significant differences either between the individual drip values of the raw samples or between the individual drip values of the blanched samples. However, the average values of both groups increased with storage time. The average drip values are presented in table 2.

Table 2 - Results of Drip Measurements on Raw and Blanched Pacific Oysters

Item	Product	Storage Period, Months at 0° F.							
		0	2	4	6	8	10	13	
Percent free drip ^{1/}	Raw ^{3/}	4.9	7.1	8.0	8.7	9.8	11.9	9.0	
	Blanched ^{4/}	14.1	13.9	15.6	16.1	15.4	13.3	13.5	
Percent expressible drip ^{2/}	Raw ^{3/}	5.8	7.5	8.9	9.9	9.4	11.5	11.3	
	Blanched ^{4/}	8.3	8.0	11.6	11.6	11.1	15.7	15.1	

^{1/} PERCENTAGE OF FREE DRIP--PERCENTAGE WEIGHT OF LIQUID LOST DURING EXACTLY TWO MINUTES OF DRAINING ON A STANDARD NO. 4 BRASS SCREEN.

^{2/} PERCENTAGE OF EXPRESSIBLE DRIP--PERCENTAGE WEIGHT OF LIQUID LOST DURING EXACTLY TWO MINUTES OF COMPRESSION BETWEEN TWO LAYERS OF PLASTIC SPONGES UNDER A FORCE OF 2,560 GRAMS. DETERMINED AFTER FREE DRIP HAD BEEN REMOVED.

^{3/} AVERAGE OF 6 VALUES.

^{4/} AVERAGE OF 5 VALUES.

The pH values of all of the samples varied from 6.0 to 6.4 except for the samples treated with a mixture of ascorbic and citric acids. The pH values of these samples varied from 5.8 to 5.9. No reproducible change in pH occurred during storage.

There were some differences in the flavors of the stews noted by the investigators. The stews made with antioxidant-treated samples did not have the rancid flavor noted in some of the stews made with the control and the oxygen-treated samples. Propylene glycol, the solvent used in the application of Tappel's mixture, gave the stew a bitter unpleasant off-flavor. This flavor was not detected when the oysters were rinsed with water before the stew was prepared.

The taste panel members were found to be somewhat erratic in their judgment of the various samples. The average scores received by the treated samples were not very different from the scores received by the control sample through the 11-

month examination. At the 13-month examination, samples treated with ascorbic-citric acids, Tappel's mixture, nitrogen, and nitrogen-blanching received average flavor scores (8.2-8.3) that were considerably higher than those given the control samples (average 6.8). Because no consistent or significant differences between the control samples and the experimental samples had been noted in previous examinations, the findings at the 13-month examination can be considered as an indication only.

CONCLUSIONS

The storage life of freshly shucked Pacific oysters, frozen in hermetically-sealed containers and stored at 0° F., appears to be approximately 8 months. The antioxidants tested appear to have at least a limited effect in retarding oxidative changes in Pacific oysters frozen in sealed cans. Replacing the air in the headspace of the can with nitrogen or with oxygen had very little effect on the rate at which the samples deteriorated. Nitrogen slowed the rate slightly, whereas oxygen increased it slightly.

There are several important factors which should be considered before antioxidants are used. First, antioxidants are of little or no value if the quality of the oyster is poor at the time of freezing. Second, proper care and handling are more important in obtaining a good frozen oyster than antioxidant treatment. Third, the carrier used in applying the antioxidant must be carefully chosen. It must not have a flavor which would be detectable in the oyster product and it must be acceptable to the Food and Drug Administration.

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CHEMICAL COMPOSITION VARIES FOR DIFFERENT PARTS OF FISH

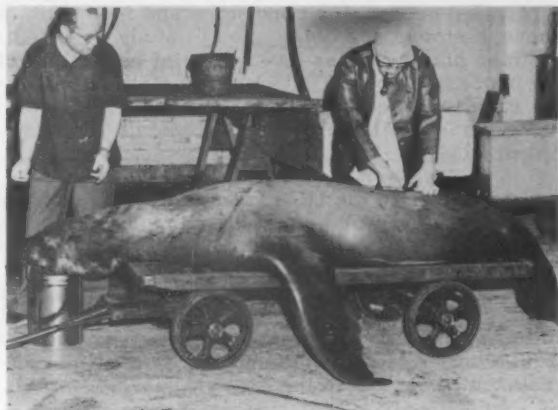
Information about the complex composition of fish is needed for such fields as nutrition, processing, and use of waste materials. This knowledge has been sought for many years, but a great deal remains to be learned as to the composition of over 200 edible species of fish and shellfish marketed in the United States. The technological laboratories of the United States Fish and Wildlife Service have under way a continuing project to analyze chemically salt-water and fresh-water fish as samples become available. Recently, at the Seattle laboratory, determinations have been made to compare the composition of different parts of fish meat. Twelve species of fish, caught commercially along the Pacific Coast, were carefully cleaned and the following portions were separated: light meat, dark meat, belly flap, dorsal (strip along back of fish), and waste. A number of interesting results were obtained from these analyses. Oil distribution in the meat, in order of decreasing amounts, was in the dorsal, dark meat, belly flap, and light meat. Dorsal meat from several species contained 11 times more oil than light meat from the same species. Light meat, however, had the highest protein content and dorsal meat the lowest, even lower than the waste material.



COMMERCIAL USE OF ALASKA SEA LIONS STUDIED

Studies of a possible commercial use for the Alaska sea lion, under way at the United States Fish and Wildlife Service Technological Laboratory at Ketchikan, Alaska, have shown that the sea lion may be processed into meal without alteration of the reduction equipment. This large marine animal (weighing up to 2,200 pounds), which is classed as a predator by most commercial fishermen, has potential value as animal food and as raw material for reduction to meal and oil. The present phase of the Laboratory's investigation is concerned with the most likely commercial application, that is, to reduce the animal to meal and oil in existing Alaska reduction plants.

Laboratory experiments were recently completed whereby a whole sea lion, without viscera, was reduced to meal and oil. These experiments indicated that the only necessary additional piece of equipment would be a suitable grinder to prepare the carcass for reduction in existing equipment. The laboratory-produced meal will be assayed for its value as a protein source by chick-feeding tests.



TAKING MEASUREMENTS OF 800-POUND MALE SEA LION.

In past investigations, parts of sea lion such as the liver, viscera, meat, and bone were reduced to separate meals. Protein evaluation of these meals by chick-feeding tests indicated that the liver meal was exceptionally good, meat meal and viscera meal were fair, and bone meal was poor. Proximate analyses have indicated that the hide is a good protein source. It is believed that the carcass meal, recently produced, should be of considerable value for chick feeding.

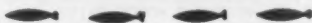
NOTE: SEE COMMERCIAL FISHERIES REVIEW, JANUARY 1957, P. 5.



STUDY OF DRY SOLIDS, SALT, AND FREE LIQUOR RELATIONSHIPS IN OYSTERS

Collection of samples for studies on the relationships between free liquor, salt, and dry solids of oysters, being conducted by the Service's Fishery Technological Laboratory, College Park, Md., was half completed when the Chesapeake season closed during the last week in March. The collection of samples was started in February. The work has been suspended until the new season begins in September. The three factors mentioned are used to test the degree of loss of liquid from the oyster after processing.

Liquor loss appears to differ in oysters taken from different beds, from one week to the next and from one season to another. Other factors apparently affecting liquor loss from oysters appear to be sex, climatic conditions, degree of cultivation of the oyster, and possibly many others. The data thus far obtained for 44 samples of oysters have shown markedly that the problem of determining the ultimate cause or causes of liquor loss is extremely complex.



TECHNICAL NOTE NO. 38 - A PORTABLE FISH-MEAL BLENDER FOR PILOT-PLANT USE

A portable fish-meal blender was constructed recently by the Seattle Technological Laboratory in order to simplify the mixing and sampling of experimentally-produced meals in quantities up to 200 pounds. The experimental meals, prepared under rigidly controlled processing conditions and from fish of known history, are being used to study the effects of prior history of the raw material as well as of the processing conditions on the nutritive values of the resultant meals. The research is supported by funds made available by the Saltonstall-Kennedy Act of 1954.

As shown in the illustrations (figs. 1, 2, and 3), the vertical worm-type blender, used in some commercial units on a larger scale, was adapted for laboratory purposes. The unique features of the modified blender design are the use of a light, strong, funnel-shaped hopper mounted on a wheeled base for portability and a gearhead motor drive located at the base of the unit for safety and convenience of access to the hopper.

Meal, when placed into the hopper for blending, is conveyed from the bottom of the hopper upward to the surface of the meal where the rotating worm throws it tangentially against the sloping sides of the hopper. A cavity is created, at the bottom of the hopper in the neighborhood of the screw, which is continuously refilled by the movement of the meal downward along the sloping sides of the hopper.



FIG. 2 - A DOWNWARD VIEW OF THE MEAL BLENDER, SHOWING THE 6-INCH DIAMETER HELICAL WORM.

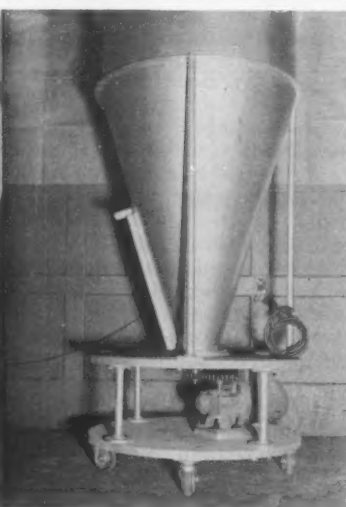


FIG. 3 - THE LOWER PART OF THE MEAL BLENDER, SHOWING THE $\frac{1}{2}$ -HORSEPOWER GEARHEAD MOTOR DRIVE.

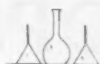


FIG. 1 - THE PORTABLE FISH-MEAL BLENDER, SHOWING THE SLIDE AT THE BASE FOR REMOVAL OF THE MEAL AFTER MIXING.

The blended material is removed through a sliding door at the base of the hopper. Laboratory tests in which a dye tracer* was added to a 100-pound batch of meal showed that thorough mixing of all components in the meal required approximately 10 minutes.

The blender consists of five main elements: (1) a funnel-shaped hopper 48 inches high with a 26-inch diameter at the top and tapering to a 6-inch diameter at the base; (2) a vertical helical worm 48 inches long and 6 inches in diameter; (3) two

shaft bearings consisting of a top radial bearing and a tapered roller bearing at the base; (4) a $\frac{1}{2}$ -horsepower gearhead motor drive; and (5) a double-decked caster-mounted dolly of 1-inch thick plywood to carry the assembly. The 12-inch space between decks on the dolly provide space for the gearhead motor which drives the vertical worm at 250 r.p.m. The unit is constructed to allow the use of a tight cover when desirable during the mixing period.



BOILED SALMON WITH EGG SAUCE

Salmon are caught in both the North Atlantic and North Pacific Oceans, and in certain fresh water streams entering these oceans.

The meat is fine in texture, yet firm and moist. It varies in color from almost white to bright red. The protein content is substantial. Salmon also contain the important minerals and vitamins necessary for proper nutrition of the body.

Regardless of where you reside, the home economists of the United States Fish and Wildlife Service suggest that this summer you try this traditional New England menu which contains "Boiled Salmon with Egg Sauce," new potatoes, and peas.

BOILED SALMON WITH EGG SAUCE

2 POUNDS SALMON STEAKS OF FILLETS	3 TABLESPOONS SALT
2 QUARTS BOILING WATER	EGG SAUCE

Cut steaks into serving-size portions and place in a wire basket or on a plate. If a plate is used it should be tied in a piece of cheesecloth. (This will prevent the fish from breaking up and facilitates removal when cooked.) Lower the fish into the salted boiling water and simmer about 10 minutes or until it flakes easily when tested with a fork. Remove fish carefully to a hot platter. Cover with egg sauce. Serves 6.

EGG SAUCE

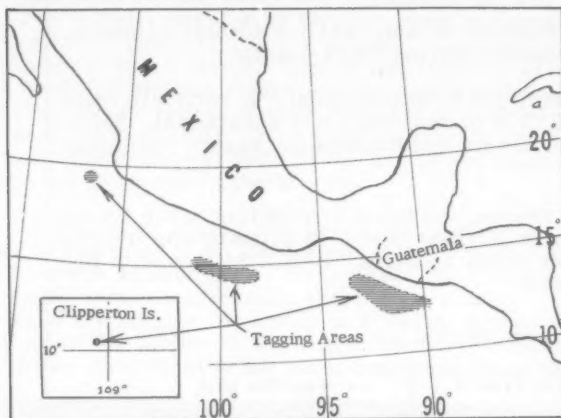
2 TABLESPOONS BUTTER OR MARGARINE	DASH PEPPER
2 TABLESPOONS FLOUR	1 CUP MILK
$\frac{1}{2}$ TEASPOON SALT	3 HARD-COOKED, EGGS, CHOPPED

Melt butter; blend in flour seasonings. Add milk gradually and cook until thick and smooth, stirring constantly. Add eggs; heat. Serves 6.

TRENDS AND DEVELOPMENTS

California

TUNA TAGGED OFF THE COASTS OF MEXICO, GUATEMALA, AND EL SALVADOR (M/V Constitution Cruise 57-C-1): In the waters off Southern Mexico, Guatemala, El Salvador, and Clipperton Island, biologists of the California Department of Fish and Game aboard the commercial tuna clipper *Constitution* tagged 871 yellowfin tuna and 128 skipjack tuna with the co-operation of the crew. The cruise (January 23-March 22, 1957) was cut short due to engine trouble.



TUNA-TAGGING CRUISE 57-C-1 (TUNA CLIPPER CONSTITUTION).

The cruise was planned for the following purposes: (1) to tag yellowfin tuna and skipjack with type G "spaghetti" tags; (2) to continue testing the relationship between tag color (red and white) and tag recovery success; (3) to field test efficiency of dart-type tags; (4) to make incidental collections and observations of marine life.

The 999 tuna tagged and released in good condition consisted of 871 yellowfin and 128 skipjack tuna. Of these 999 fish, 815 were tagged off the coasts of Guatemala and El Salvador, 178 off Southern Mexico, and 6 off Clipperton Island.

A total of 130 fish, predominately yellowfin tuna, were tagged with experimental dart tags. Two types of heads were used on the darts--hollow nylon tubing and solid nylon rod. It was found that both types could be applied quicker and easier than conventional loop tags. All dart tags were applied slightly ahead of the second dorsal fin and the dart locked between the spines.

On several occasions during the cruise freshly-caught yellowfin tuna were observed to have large healed and partially healed wounds apparently inflicted by sharks. These fish were actively feeding on the bait thrown from the boat and showed no ill effects from their injuries.

Surface water temperatures in areas fished ranged from 76° F. to 82° F. The Gulf of Tehuantepec showed the greatest temperature variation, 76° F. to 81° F., temperatures elsewhere ranged from 80° F. to 82° F.

Number of Fish Released by Tag Colors and Type

Species	Loop		Dart			Totals
			Hollow Tip		Solid Tip	
	Red	White	Red	White	Clear	
Yellowfin	360	403	44	49	15	871
Skipjack	53	53	11	0	11	128
Totals	413	456	55	49	26	999

(Number of Fish)

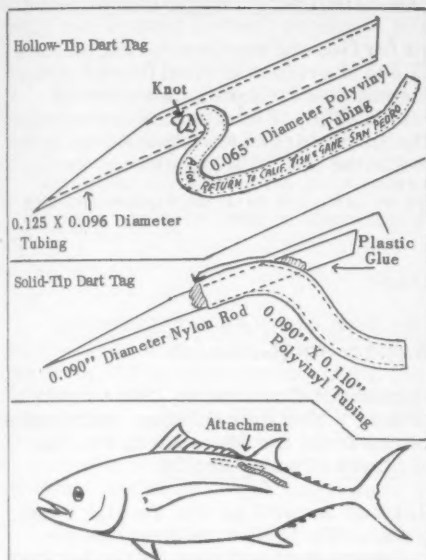


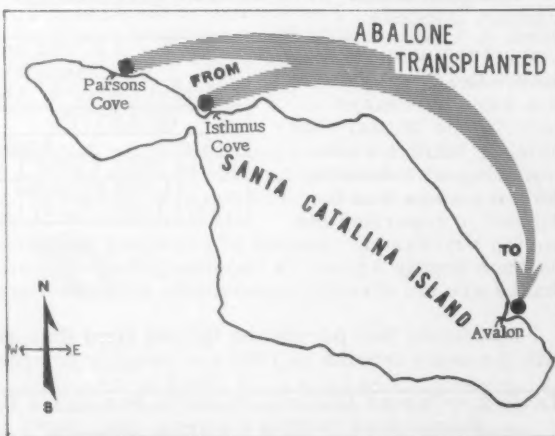
DIAGRAM OF DART-TYPE TAGS AND LOCATION OF TAG ON TUNA (TUNA CLIPPER CONSTITUTION, CRUISE 57-C-1)

A collection of marine life specimens was made from night light stations, tuna stomach contents, bait-net hauls, and by brailing from the boat when in the vicinity of logs.

ABALONE TAGGING AND SURVIVAL STUDIES (M/V Nautilus Cruise 57-N-1): Over 1,000 pink abalone (*Haliotis corrugata*) were collected off Santa Catalina Island by divers working from a diving boat (Mollusk) and transported aboard the Nautilus by biologists of the California Department of Fish and Game for tagging. In addition, the red abalone (*Haliotis rufescens*) transplanted in Isthmus Cove, Santa Catalina Island, in February 1957 were found to have adapted themselves successfully in the new environment.

The purpose of the cruise (March 23-April 1, 1957) was: (1) to measure and tag pink abalone as a method to determine growth rate; (2) to develop transporting methods and techniques for pink abalone; and (3) to inspect the red abalone transplanted to Santa Catalina Island from San Miguel Island by the abalone inspection in February 1956.

Of the 1,000 or more abalone collected, over 800 were taken from Parsons Cove and approximately 200 from Isthmus Cove. The abalone were measured and tagged during transport and placed on the bottom on the east side of Avalon Harbor in the Fish and Game preserve area. Representatives of the City of Avalon and other prominent citizens were advised of the project and promised full cooperation to see that the abalone would not be disturbed. New tags and tagging methods were developed for the pink abalone; due to their shell structure it was not possible to utilize the same tags used on the red abalone. These red abalone have taken over in this new location and adapted themselves successfully. Only one empty shell was found. Many of the red abalone were observed which had added growth to their shells. Of the original plant it is estimated that approximately 85-90 percent have survived.



M/V NAUTILUS CRUISE 57-N-1, MARCH 23-APRIL 1, 1957



Cans--Shipments for Fishery Products, January-February 1957



Total shipments of metal cans for fish and sea food during the first two months of 1957 amounted to 13,335 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 10,542 short tons in the same period of 1956. Fish canning in the first part of 1957 was largely confined to the packing of tuna, mackerel, and anchovies in California and oysters in the Gulf of Mexico area.

NOTE: STATISTICS COVER ALL COMMERCIAL AND CAPTIVE PLANTS KNOWN TO BE PRODUCING METAL CANS. REPORTED IN BASE BOXES OF STEEL CONSUMED IN THE MANUFACTURE OF CANS, THE DATA FOR FISHERY PRODUCTS ARE CONVERTED TO TONS OF STEEL BY USING THE FACTOR: 23.0 BASE BOXES OF STEEL EQUAL ONE SHORT TON OF STEEL.



Coast Pilot for Pacific Coast to be Revised

The Coast and Geodetic Survey, U. S. Department of Commerce, has started revising the Pacific Coast edition of its "Coast Pilot." The new volume, which will give up-to-date descriptions of perils and landmarks from the Mexican to the Canadian border, will be published in 1958 as United States Coast Pilot 14.

The 1958 volume will include the Hawaiian Islands as well as the Pacific Coast. The Survey is using a new and more compact format. By 1960 it will reduce the number of volumes from the present ten to six. Others in the series cover the Atlantic and Gulf Coasts and Alaska. Annual supplements are supplied for each.



Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, APRIL 1957: Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of De-

fense, 1.8 million pounds (value \$970,000) of fresh and frozen fishery products were purchased in April by the Military Subsistence Market Centers. Beginning with January 1, 1957, a change was instituted in reporting the

amount purchased. Instead of reporting deliveries as in the past, the Military Subsistence Supply Agency is reporting what was ordered. Therefore, this year's purchases are not directly comparable with previous years.

Table 1 - Fresh and Frozen Fishery Products Purchases by Military Subsistence Market Centers, April 1957 with Comparisons							
QUANTITY				VALUE			
April		April		April		April	
1957	1956	1957	1956	1957	1956	1957	1956
.....(1,000 Pounds).....				(\$1,000).....			
1,837	1,835	7,367	6,778	970	832	3,832	3,533

Assuming that purchases for the first four months of this year as compared with the same months in 1956 are roughly comparable, purchases were higher by

Table 2 - Canned Fishery Products Purchases by Military Subsistence Market Centers, Jan.-Apr. 1957				
Month	QUANTITY			
	Tuna	Salmon	Sardines	Total
.....(1,000 Pounds).....				
Jan.-Apr.	841	992	31	1,864

about 8.7 percent in quantity and 8.5 percent in value for the first four months of 1957.

Prices paid for fresh and frozen fish-

ery products in April averaged 52.8 cents a pound, or about 2 percent less than the average of 54.0 cents paid in March, but higher by about 17 percent than the April 1956 average of 45.3 cents.

Canned Fishery Products: Canned sardines (12,000 pounds, valued at \$4,027) were the canned fishery products purchased for use of the Armed Forces during April 1957.

In addition to the purchases made under contract, the Armed Forces generally make some local purchases which are not included in the data given. Therefore, actual purchases are higher than indicated, but it is not possible to obtain the local purchases made by military installations throughout the country.



Fish Hatchery

CONTRACT AWARDED FOR OREGON SALMON HATCHERY: The award of a contract for the construction of the Cascade Salmon Hatchery on Eagle Creek near the town of Cascade Locks, Oreg., was announced on April 29 by the Assistant Secretary of the Interior for Fish and Wildlife. The contract for \$541,418 was awarded to a Portland, Oreg., firm.

The hatchery is being built as part of the Columbia River Fishery Development program authorized by Congress to restore depleted Columbia River salmon runs.

"Construction of this salmon hatchery is an excellent example of cooperation among Federal and state agencies," the Assistant Secretary pointed out. "Funds for the hatchery are appropriated by Congress to the Corps of Engineers and turned over to the United States Fish and Wildlife Service. The United States Forest Service of the Department of Agriculture has agreed to provide the site and the Oregon Fish Commission will take over operation of the hatchery."

Activation of this contract will start the seventh of 15 salmon and steelhead hatcheries contemplated for the State of Oregon under the program. States co-operating in the program are Oregon, Washington, and Idaho.

Work to be accomplished under the Cascade hatchery contract consists of construction of raceway ponds, holding pond and fish ladder, hatchery and utility building, residence quarters and garages, sewer system, water system roads, and relocation of a Forest Service residence.

The Cascade hatchery, when completed, will be devoted to the artificial propagation of chinook, silver, and chum salmon and will have an estimated annual production of 11,000,000 young migrants--a measurable contribution to the restoration program.



Fisheries Loan Fund

APPLICATIONS TOTAL \$8 MILLION: As of April 29, a total of 211 fishery loan applications amounting to \$7,962,100 had been received by the United States Fish and Wildlife Service. Of these, 86 cases amounting to \$2,487,400 have been approved.



Florida

FISHERIES RESEARCH, JANUARY-MARCH 1956: The following are some excerpts from the Quarterly Report on Fisheries Research, March 1957, of the Marine Laboratory of the University of Miami.

Landings: Preliminary 1956 total landings for Florida show an increase over 1955 of more than 32 million pounds. Much of this can be attributed to a larger menhaden catch. Other preliminary figures indicate an increase in the landings of shrimp, Spanish mackerel, grouper, and spiny lobster. Mullet, the second most important fishery in the State has stabilized over the past few years. Shrimp were again the major source of fishery income to the state and will probably show the second best year in history with over 54 million pounds landed, with an ex-vessel value of over 18 million dollars.

Tortugas Shrimp Fishery: The collection and analysis of shrimp dealers' records continued throughout the quarter. To date records on 11 boats from a single dealer in Key West have been gathered and processed covering the years 1953 through 1956. The yearly average catch per unit of effort shows a downward trend with a decrease of about 90 pounds a boat a night over this four-year period. Records of 16 boats fishing out of Naples have been gathered and processed. These records cover the years 1954 through 1956 and also show a downward trend with a decrease of over 120 pounds a boat a night over the three-year period.

Over this same period there has been a sharp increase in the number of boats fishing the grounds. Preliminary figures suggest that the number in 1953 may have been under 300 and that for 1956 about 600. Total production for this same time period has increased slightly over 20 million pounds.

It is too early in the study to say if these catch-per-unit-of-effort figures are representative of abundance of shrimp or if they reflect fishing intensity. Records from boats fishing during the early period of the fishery will provide us with some clues concerning the value of the catch per boat per night as an indicator of apparent abundance.

The appearance of two peaks in the small shrimp fishery, one in the spring and one in the fall, becomes more certain as additional records are obtained.

Spotted Sea Trout: The apparent decline in commercial landings of spotted sea trout can probably be explained by the fact that these fish were formerly taken incidental to mullet fishing. The decline in mullet landings due to low prices began in mid-1952 and has continued to the present time. This decline is closely paralleled by a decline in landings of spotted sea trout.

A decided shift by the commercial fishermen to species which are not associated ordinarily with the spotted sea trout has become apparent. This shift eliminates much of the production formerly obtained by these experienced fishermen.

Mullet Marketing: Some time was spent during the quarter on a follow-up of the mullet mar-

keting study. Fish dealers from Naples to Pensacola were contacted concerning this study and recommendations made. Market outlets for Florida fishery products were discussed. Particular emphasis was placed on the market areas of Cincinnati, Milwaukee, and Detroit.

Black Spot Control in Shrimp: Control of black spot in shrimp continues to be a major activity. Sodium bisulfite is now being widely used in the Florida industry and tests are being conducted to ensure its proper use, and to determine more accurately its effects.

Earlier reports showed that 2½-percent dip solutions gave the best control of black spot in experimental work. Field tests led to the recommendation that half this concentration (1¼ percent) should be used, balancing a somewhat reduced effectiveness against black spot control with reduced cost and less chance of misuse.

The most recent experiments involved the use of still lower concentrations (0.5 percent) to determine if this was sufficiently effective for practical use. This experiment started at the end of March and results were expected early in April.

Studies were continued to determine the effect of antioxidant butylated hydroxy toluene (Ionol) on black spot in shrimp. Results from these tests indicate that at levels above 1.0 percent black spot can be retarded up to 14 days, providing that the dipping time is for periods longer than five minutes.

Studies were commenced on the use of Ionol when applied as a glaze to frozen shrimp. Samples will be drawn for testing over a nine-month period to determine if blackening during frozen storage can be retarded in this way.

Spoilage Control in Shrimp: Studies were continued to determine the preservative action on shrimp of the antibiotic terramycin when applied in a dipping solution.

A trip was made in February on a shrimp boat out of Key West, and samples of pink shrimp (*Penaeus duorarum*) were dipped in three concentrations of seawater solutions of terramycin. Concentrations of 10, 30, and 50 parts per million were dipped for 1, 5, and 15 minutes, so that a total of nine conditions were tested. Three control (untreated) samples were also collected.

Bacterial counts on the treated samples from these tests showed no significant differences from the controls. Odor and taste scores likewise showed small and probably insignificant differences compared to control scores. Black-spot incidence did not seem to be increased or decreased by the use of the antibiotic.

Further tests are planned using terramycin in April.

Another bactericidal agent was tested, in an attempt to find a means of reducing shrimp spoilage. This is Dynactol (monoxychlorosene) which was tested as a seawater dip solution at 0.3-percent concentration. This work was carried out on a vessel out of Key West during February.

Results of this one test were promising, the quality of the shrimp (in terms of bacterial counts, taste and odor scores) being better than the controls. An important additional fact was that black-spot incidence seemed to be considerably reduced.

Further tests were planned in May with this chemical.

Rancidity in Fish: The study on the effect of chemicals in controlling the development of rancidity in frozen Spanish mackerel was completed. Results from these tests indicate that concentrations of the antioxidant Ionol in the range of 200-300 p.p.m. are effective in the control of rancidity. At concentrations lower than 200 p.p.m. the chemical was ineffective and taste panel scores were either not higher or below that of the control.

Concentrations of Ionol in the 200-300 p.p.m. range were also effective in preventing the fading of the pigment spots. The controls, which had not been treated, showed bleaching. This follows the successful retention of color of red snappers (*Lut-*

janus aya) with Ionol at the 200-300 parts per million fresh-water solutions. The color remained bright after six months of storage.

Smoking: Studies were continued on the prevention of mold in smoked fish (mullet and mackerel). Results from the first test indicated that neither the treated nor untreated samples of smoked fish showed any signs of mold growth up to 20 days when held under ice box temperatures. This was true whether the samples were wrapped in Mylar 332 (an experimental film produced by DuPont) or unwrapped, whether treated with sorbic acid or not.

Both treated and untreated samples held in room temperatures showed signs of mold growth on the eighth day of storage. Treatment involved dipping the fish in a 0.1-percent solution of sorbic acid.

A second series of tests were run on smoked mullet. Both wrapped and nonwrapped samples were held under room temperatures. In this test samples were wrapped in Mylar 322 and the bag was filled with carbon dioxide gas. Other samples wrapped in Mylar 322 were sprayed with 0.5-percent sorbic acid. None of these two groups of samples showed any signs of mold after 21 days of storage, and the experiment is continuing.

Maine Sardines

CANNED SARDINE STOCKS, APRIL 1, 1957: Distributors' stocks of Maine canned sardines totaled 295,000 actual cases as of April 1, 1957, exactly 49,000 cases or 14.2 percent less than the 344,000 cases held by distributors on January 1, 1957. Stocks held by distributors on April 1, 1956, amounted to 268,000 actual cases, according to estimates made by the U. S. Bureau of the Census.

Canners' stocks on April 1, 1957, were 465,000 standard cases (100 $3\frac{1}{4}$ oz. cans) as compared with the 879,000 cases held on January 1, 1957, and 152,000 cases on April 1, 1956.

Table 1 - Canned Maine Sardines--Wholesale Distributors' and Canners Stocks, April 1, 1956 with Comparisons

Type of Stocks	Unit	1956/57 Season			1955/56 Season				
		4/1/57	1/1/57	11/1/56	7/1/56	6/1/56	4/1/56	1/1/56	11/1/55
Distributor	1,000 actual cases	295	344	388	154	160	268	326	354
Canner	1,000 std. cases $\frac{1}{100}$	465	879	1,016	315	64	152	475	625

$\frac{1}{100}$ 100 $3\frac{1}{4}$ -OZ. CANS EQUAL ONE STANDARD CASE.

The pack of Maine sardines during the 1956 packing season amounted to 2,221,793 standard cases, much higher than the 1,254,222 standard cases packed in the 1955 season. However, the 1955 sardine pack was the lowest since 1939. Shipments from April 15, 1956 (the beginning of the season) to April 1, 1957, totaled 1,877 standard cases, somewhat higher than shipments of 1,793 cases for the same period a year earlier.

Marketing Prospects for Edible Fishery Products, Summer 1957

United States civilian consumption of fishery products per person was at least as large this winter as last, and is expected to continue close to the year-earlier rate this summer. Retail prices, judging from the Bureau of Labor Statistics wholesale prices in primary markets, averaged about the same as in the first quarter of 1956. They will likely maintain this relationship to the year-ago level.

Commercial landings of edible fish and shellfish this winter for use in the fresh or frozen forms differed little in total from those of a year earlier but there were variations in the catch of individual species in the two periods. Commercial fishing operations are now on a seasonal upswing, which will continue until early or mid-summer.

About 34 million pounds of edible fishery products were frozen commercially in the continental United States during the first quarter of 1957. This was 12 percent less than in the same part of 1956. Part of the reduction apparently is due to under-reporting on freezings of fish sticks. The total volume of freezings will soon be increasing seasonally with the catch reaching a peak in July or August.

Cold-storage holdings of frozen fish and shellfish on May 1 totaled less than a year earlier. The trade will soon begin building up stocks for marketing next winter when commercial landings are at their seasonal low point.

Imports of edible fishery products during the next few months are expected to be close to the year-earlier total, but some reduction in exports is probable. The latter will in large part be due to the fact that our supplies of canned California sardines (pilchards) are relatively low because of the poor pack last fall. California sardines have always been one of our major export items among edible fishery products.

This analysis appeared in a report prepared by the Agricultural Marketing Service, U. S. Department of Agriculture, in cooperation with the U. S. Fish and Wildlife Service, and published in the former agency's May 2 release of The National Food Situation (NFS-80).

NOTE: SEE COMMERCIAL FISHERIES REVIEW, MARCH 1957, P. 23



Maryland

SHELLFISH RESEARCH STUDIES: The current shellfish research program of the Maryland Department of Research and Education falls into three general divisions. (1) Studies of the soft shell clam (*Mya arenaria*), and of hydraulic clam dredging, constitute the full time program of two biologists of the Chesapeake Biological Laboratory at Solomons. (2) Oyster studies in the Chesapeake area are conducted by two other biologists of the Laboratory staff who are assigned to this work on an approximate half-time basis. (3) Oyster studies in the Chincoteague Bay area constitute the major portion of the program of a resident biologist stationed at the Department's field laboratory in Worcester County. Certain phases of the research program are conducted jointly by the above divisions, and there are several cooperative projects with personnel of the Department of Tidewater Fisheries and of the United States Fish and Wildlife Service Laboratory at Annapolis.

Soft Clam Studied: Present emphasis in the soft-shell clam program deals with the effects of hydraulic clam dredging upon the bottom structure, upon rooted

marine vegetation, upon the oyster population, upon the clam population, and upon other associated organisms, especially those of economic importance. Experimental plots have been set aside in the Patuxent River and in Eastern Bay. Observations have been made by aerial photography, skin diving, glass-bottomed viewing boxes, direct observation of flats exposed by exceptional low tides, bottom cores, and by instruments for measuring turbidity and siltation. A modern commercial-type hydraulic clam dredge is used for experimental dredging and gathering clam population data. Studies of spawning, setting and growth of the soft clam in the Chesapeake area are in progress, and a study of the effect of temperature upon pumping rates of the clam has been completed. A paper dealing with the effects of hydraulic clam dredging has just been published. This supplies information of use to the General Assembly in their consideration of regulatory measures for the industry.

Oyster Studies: Active projects in the Chesapeake oyster research program center around setting and oyster growth. The time and intensity of setting are determined annually by test-shell exposures in the Solomons area and in selected areas that offer potentialities for seed production. Counts of the surviving commercial set on State shell plantings and upon old cultch on natural bars, together with observations on the composition of the bar populations, are made during the fall and winter months in cooperation with the Department of Tidewater Fisheries and the Annapolis Shellfisheries Laboratory of the U. S. Fish and Wildlife Service. Comparisons of rates of growth and of mortality are made among groups of experimental seed oysters from different sources when planted on trays at Solomons and in Chincoteague Bay. Determinations of oyster larvae abundance are made by means of single continuous samples of water pumped from a 12-foot depth by a boat moving the length of the area to be studied. The relationship of the observed number of larvae to the subsequent spatfall on test shells is being studied as a possible means of predicting oyster sets in a given area. Trays of shells are planted during different months of the year at a selected location in St. Marys River in order to compare the efficiency as cultch of shells planted at different seasons. The weighted incidence of infection by the fungus Dermocystidium marinum (a standard method for scoring the degree of infection) is determined each fall from oyster samples in those areas where the parasite has been found.

Studies of the seasonal abundance of oyster drills in Chincoteague Bay, and of the effectiveness of drill traps as a control measure are being made in cooperation with the United States Fish and Wildlife Service. Oyster sets on experimental plantings of shells in intertidal windrows, and in suspended wire bags, are being evaluated as a possible source of local seed. The growth and survival of this seed is being compared with that from other sources. Data upon the nature and relationship of the hydrography of the area to oyster growth and to the distribution and abundance of the hard clam are being gathered, together with a general survey of the marine biota.

Compilation of hydrographic and meteorological data is on a continuous basis so that the effects of seasonal and annual variations in environment upon shellfish can be evaluated (G. F. Beaven, Maryland Tidewater News, January-February 1957).

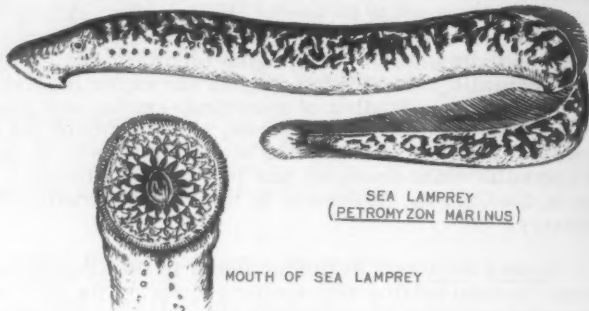


Michigan

SEA LAMPREY WEIRS OPERATING IN 1957: The operation of 90 sea lamprey weirs in Michigan streams was under way in April and many streams will be protected against the passage of the parasitic sea lamprey this year.

The Michigan Conservation Department Director recently granted permission to the United States Fish and Wildlife Service to install, maintain, or operate "screens, weirs, traps and electrical devices" in 90 streams tributary to the Great Lakes for control and suppression of sea lampreys.

The streams include 50 in the upper peninsula, tributary to Lake Superior; 21 upper peninsula streams which flow into Lake Michigan; 17 lower peninsula tributaries of Lake Michigan; and 2 lower peninsula streams which flow into Lake Huron.



SEA LAMPREY
(*PETROMYZON MARINUS*)

MOUTH OF SEA LAMPREY

The weirs, located near the mouths of streams, set up an electrical barrier which prevents lampreys and fish from moving upstream. Instead, lampreys and fish are guided into traps. The game fish are then removed from the trap and allowed to continue upstream while the lampreys are destroyed.

Lampreys attempt to move from the Great Lakes into streams to spawn and the weirs generally will be in operation from April 1 to July 31, a period which covers the normal spawning time of this parasitic fish that has invaded the Great Lakes in recent years and caused heavy mortality among Great Lakes fish populations, particularly lake trout.



Moorage of Fishing Vessels at Port Orford, Oregon



The safe moorage of fishing vessels presents many difficulties. This article is a photographic report of how the problem of moorage has been solved at Port Orford, a fishing community in southern Oregon not far from the Oregon-California border.

FIG. 1 - THE OPEN EXPOSED HARBOR AT PORT ORFORD. (THE LINE ACROSS THE PICTURE IS A STEEL CABLE ATTACHED TO THE END OF THE DOCK.)

FIG. 2 - THE DOCK. NOTE THE DERRICK USED TO LIFT THE TROLLERS OUT OF THE WATER. THE LARGE BUILDING ON THE RIGHT IS THAT OF A FISH COMPANY.





FIG. 3 - END OF DOCK, SHOWING THE DERRICK AND A PILE DRIVER. (THE CABLE IS THE SAME ONE THAT IS SHOWN IN FIG. 1.)

FIG. 4 - TROLLERS ON DOCK. NOTE HOW THE USE OF THE LARGE DOLLIES PERMITS THE TROLLERS TO BE MOVED EASILY TO ANY DESIRED LOCATION. THESE TROLLERS ARE DAY BOATS: THAT IS, THEY LEAVE IN THE MORNING AND RETURN IN THE EVENING OF THE SAME DAY.



FIG. 5 - FISH COMPANY SITE AT ORFORD. THE PRODUCTS THE COMPANY HANDLES ARE SALMON AND CRAB.

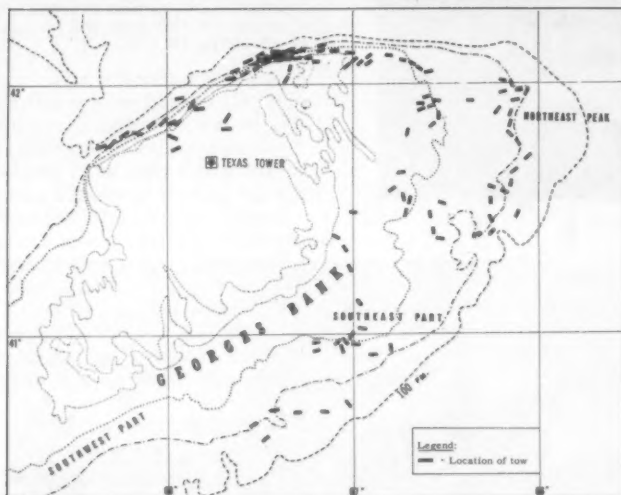
NOTE: THE AUTHOR GRATEFULLY ACKNOWLEDGES THE AID OF CARL FISHER OF THE PORT ORFORD FISH COMPANY.

--BY F. BRUCE SANFORD, CHEMIST,
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SEATTLE, WASH.



North Atlantic Fisheries Exploration and Gear Research

SIZEABLE COMMERCIAL CONCENTRATION OF SCALLOPS ON GEORGES BANK (M/V Delaware Cruise 57-4): Georges Bank supports sizeable commercial concentrations of sea scallops (*Pecten grandis*) in two areas not presently being



M/V DELAWARE CRUISE 57-4 (APRIL 23, 1957-MAY 10, 1957)

fished, according to the results of the second scallop exploratory cruise by the Service's vessel Delaware. The cruise was completed on May 10, 1957.

Scallops were found to be widespread in light commercial quantities in most all areas explored from 30 to 50 fathoms along the northern edge and west of the northeast peak. Most scallops taken were of good commercial size, with some catches yielding nine and ten meats per pound.

During the three-week trip, 117 tows were made with the best catches of 7 bushels/30-minute tow (15 eyes/1 pound) in location 1H3 2152 2138, 1H2 1037

1040 and 8 bushels/40-minute tow (10 eyes/1 pound) in location 1H3 2158 -, 1H2 1066 1057. Eight tows on the SE. part of Georges Bank in depths ranging from 46 to 72 fathoms caught no scallops. Bottom temperature at 72 fathoms was 48.2° F., while the surface temperature was 42° F. Seven tows in depths 52 to 62 fathoms from the NE. Peak in a southwest direction down to Corsair Canyon caught scallops only on two consecutive tows. The catches of 5 and 6 bushels of small scallops yielded 24 and 21 meats per pound. Bottom temperature in this area was 41.9° F. and surface temperature was 42° F. It was interesting to note that in all areas where scallops were taken bottom temperatures averaged about 42° F.

Three variations of scallop dredges were tested:

1. Standard 11' dredge.
2. Standard 11' dredge fitted with depressor plates.
3. Standard 11' dredge fitted with rake teeth and depressor plates.

Dynamometers were used to measure resistance over the bottom as the dredges were towed at different engine speeds. Distance covered was plotted by loran and all tows attempted to cover a localized area.

Initial tests indicate that at 120 r.p.m., resistance of a dredge with a depressor is from 2,000 to 4,000 pounds and the resistance of a dredge without a depressor measured 2,000 to 3,750 pounds. Further tests will be made on the catch efficiency of these two types of dredges.

Six tows made with the rake-toothdredge at 120-140 r.p.m. registered minimum dynamometer readings of 3,200 pounds with maximum readings up to 7,500 pounds. No scallops were taken on these tows probably due to improper thickness and spacing of rake teeth, which caused excessive jumping over the bottom.

Samples of the catch were brine-frozen in bags, brine-frozen individually, dry-frozen in bags, and iced on board for various lengths of time to be used for technological tests at the Service's East Boston Station.

The Delaware was scheduled to depart from East Boston June 6, 1957, for exploration of the offshore Atlantic for pelagic subsurface resources. Four weeks of long-line fishing operations will be conducted within the general offshore area bordered by 65° W. longitude and 35° N. latitude.

Information on the general distribution of tuna (bluefin, yellowfin, and albacore) species in the offshore areas during this season of the year will be the cruise's objective, supplementing the distribution and catch information obtained earlier in the year on cruise 57-3.



North Atlantic Fisheries Investigations

DRIFT OF HADDOCK SPAWN (M/V Albatross III Cruises 90 and 92): A study of the nontidal drift pattern on Georges Bank and its relation to the drift of haddock eggs and larvae was made by the Service's research vessel Albatross III in two cruises (Cruise 90, April 11-17; and Cruise 92, April 25-May 2). The studies were made to develop a method for making predictions of the future abundance of haddock on the basis of the abundance and distribution of haddock eggs and larvae.

This year radio drift buoys developed by the Woods Hole Oceanographic Institution were used to follow the drift of water masses containing developing haddock eggs. Each buoy sends a radio signal on which the vessel can "home" and thus find the instrument.

Cruise 90: The vessel returned from its first cruise of the survey on April 17. On this cruise it observed a strong concentration of eggs on the Northeast Part of Georges Bank, the usual spawning area. Three drift buoys were placed in this area and their drift observed. The buoys drifted to the south and southwest. Samples of the water showed that the eggs were drifting in the same direction. The Albatross III followed these buoys for two days, when she was relieved by the Bear of the Woods Hole Oceanographic Institution which is cooperating with the Service in these studies. The Bear returned to port on April 22.

Approximately 950 miles of continuous plankton tows were made at the surface and 10 meters with Hardy Plankton Recorders; 111 bathythermograph lowerings, 55 salinity samples, 11 meter net and 50 Hensen egg net surface tows were made; 648 drift bottles and 3 transponding buoys were released.

Haddock eggs were found in abundance on the northeast part of Georges Bank. The transponding buoys released in the center of this concentration moved in a southerly direction.

Cruise 92: Approximately 1,200 miles continuous plankton tows were made at the surface and 10 meters with Hardy Plankton Recorders; 119 Bathythermograph lowerings, 60 salinity samples, 8 meter net and 60 Hensen egg net surface tows were made; 720 drift bottles and 1 transponding buoy were released.

Only limited numbers of haddock eggs were found. Failure in triggering mechanism prevented locating transponding buoys "Hotel" and "November."

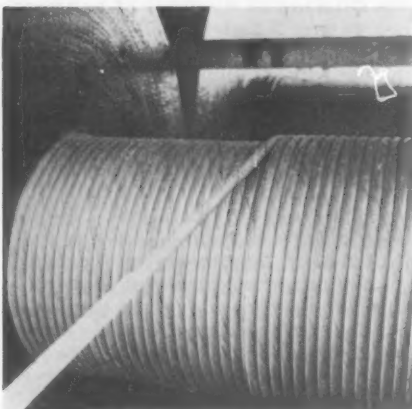
MULTIPLANE KITE OTTER BOARD TESTED (M/V Albatross III Cruise 91): During a short trip (April 22-23) the Service's research vessel Albatross III tested and calibrated a 60-pound multiple-plane kite otter board in the 100-fathom or more area south of Martha's Vineyard.

Fourteen runs were made at 7 knots and 10 knots with the following scopes of cable: 10, 20, 30, 40, 50, 75, and 100 meters. Although vibration was considerable, the gear streamed exceedingly well and appears to have excellent possibilities as a depressor for high-speed sampling gear.



North Pacific Exploratory Fishery Program

MIDWATER TRAWLING EXPERIMENTS TO BE CONTINUED (M/V John N. Cobb Cruise 31): Continuation of midwater trawling experiments was to be the objective of an 8-week cruise by the Fish and Wildlife Service's exploratory fishing vessel John N. Cobb scheduled to begin on April 29, 1957. The experimental fishing was to be done with a 64-foot nylon midwater trawl on the offshore trawling grounds from Oregon to British Columbia. It was planned to work closely with some of the commercial trawlers who have reported seeing schools of fish, presumably Pacific ocean perch, on their echo-sounders in midwater depths on many occasions when their bottom gear was relatively ineffective.



WIRE ROPE WITH INSULATED ELECTRICAL CONDUCTORS AS A CORE BEING USED EXPERIMENTALLY FOR DETERMINING DEPTH OF THE TRAWL ON THE M/V JOHN N. COBB.

A pair of new aluminum midwater trawl doors were to be tried out on this cruise. Equipment was also assembled for experiments to determine depth of the trawl by electrical telemetering. Special trawl cable having electrical conductors in the center were to be tested as a possible substitute for the present system of acoustic depth-telemetering in use on the John N. Cobb.

The cruise was planned to be "split," with a port call at Seattle scheduled for anticipated modifications to the midwater trawling gear and other experimental equipment.

* * * * *

EXPLORATORY BOTTOM FISHING TO BE CONDUCTED IN ALASKAN WATERS (M/V Tordenskjold Cruise 32): The chartered schooner-trawler Tordenskjold was scheduled to leave Seattle on or about May 16 to conduct exploratory bottom-fishing explorations in Alaskan waters. Bottom fish and king crab were to be the primary objectives of the exploration. The vessel is under charter to the Fish and Wildlife Service's North Pacific Fisheries Exploration and Gear Research project for a period of 110 to 150 days, beginning on May 15, 1957.

For approximately the first six weeks of the charter period, the Tordenskjold was to explore potential bottom-trawling grounds off southeastern Alaska, from Dixon Entrance to Baranof Island. Standard commercial-type fish trawls were to be used, and all bottom suitable for trawling will be surveyed out to depths of 300 fathoms.

In the fall of 1956, the Service's exploratory fishing vessel John N. Cobb carried out a preliminary survey on part of these grounds and found that considerable trawling bottom existed north and west of Forrester Island. Some of the catches during that cruise contained fair showings of flatfish and Pacific ocean perch, but the fall weather, which was unusually bad last year, did not allow a complete coverage of the area in which the Tordenskjold will operate.

The last two months or more of the charter were to be spent by the Tordenskjold in explorations south of the Alaska Peninsula and the eastern Aleutian Islands. Fishing with bottom trawls and king crab pots, the vessel was to survey the coastal waters and banks from the Shumagin Islands westward to Umnak Island. Distribution and availability of king crabs and bottom fish were to be recorded, and efficiency of the two types of gear in catching king crabs were to be compared in various localities. Effectiveness of king crab pots on the offshore banks were to be tested, using various types of crab-pot floats and baits.

A biologist was assigned to the Tordenskjold from the staff of the Service's King Crab Investigations to collect data on sizes of the crabs and to tag a number of crabs south of the Aleutians and the Peninsula. While in this area, the Torenskjold was to base at Sand Point in the Shumagin Islands.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, NOVEMBER 1956, P. 45 AND DECEMBER 1956 P. 46.



United States Fishing Fleet¹/Additions

A total of 45 vessels of 5 net tons and over were issued first documents as fishing craft during April 1957--26 more than during the corresponding month of

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft, by Areas, April 1957 with Comparisons

Area	April		Jan.-Apr. Total		
	1957	1956	1957	1956	
	(Number)				
New England	3	1	6	6	15
Middle Atlantic	2	1	12	8	26
Chesapeake	9	9	31	21	138
South Atlantic	9	3	28	14	119
Gulf	13	14	35	29	105
Pacific	5	10	19	14	76
Great Lakes	2	-	2	2	6
Alaska	2	9	10	12	40
Hawaii	-	-	-	1	1
Total	45	47	143	107	521

NOTE: VESSELS ASSIGNED TO THE VARIOUS SECTIONS ON THE BASIS OF THEIR HOME PORT.

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft, by Tonnage, April 1957

Net Tons	Number
5 to 9	20
10 to 19	12
20 to 29	3
30 to 39	6
40 to 49	1
80 to 89	1
110 to 119	1
120 to 129	1
Total	45

1956. The Gulf area led with 13 vessels, followed by the Chesapeake and South Atlantic areas with 9 each, the Pacific Coast area 5, New England 3,

and the Middle Atlantic, Great Lakes, and Alaska 2 each.

For the first four months of this year a total of 143 vessels of 5 net tons and over were issued first documents as fishing craft as compared with 107 vessels in the same period a year earlier. This indicated that more vessels entered the fisheries this year than last.

¹/ INCLUDES BOTH COMMERCIAL AND SPORT FISHING CRAFT.



U. S. Fish and Wildlife Service

COMMERCIAL FISHERIES ACTIVITIES IN FISCAL YEAR 1956: The Annual Report of the Fish and Wildlife Service for the year ending June 30, 1956, recently released lists activities in fiscal year 1956. The Service's activities of interest to commercial fisheries included:

The establishment of the first voluntary standard of grade and condition for fishery products.

Continuation of a vigorous salmon restoration program in Alaska.

Large-scale testing of several electronic devices used in fish guiding, counting, and other fishery research.

Numerous studies relative to shellfish.

Two promising selective poisons for use in sea lamprey control out of 4,600 compounds tested over a period of time.

Numerous oceanic research problems for the benefit of the fishing industry.

Exploratory fishing cruises discovered a yellowfin tuna resource in the southern part of the Gulf of Mexico, located a red shrimp resource in the deep waters of the South Atlantic, found a fishing ground for large lobsters off New England in deep water, found a new ocean perch fishing area, and studied the Maine sardine fishery.

Through a technological research program, the Service isolated certain chemical components of fish oil which may pave the way for the creation of many new products.

Two fishery motion pictures in sound and color were completed during the year and a third started. These films are financed by interested segments of the fishing industry.

Daily fishery market news reports were released in key areas from seven strategically-located reporting offices. Fish transportation and importation problems were studied. Monthly bulletins were issued on landings in 12 coastal states and Ohio on Lake Erie.

Vigorous restoration measures were continued in the Alaska salmon fisheries. The pink salmon fishery in Prince William Sound was closed completely and trap fishing in southeastern Alaska reduced by 50 percent; more protection was given salmon in the various bays, and the stream guard program was intensified.

Restrictions were invoked and lake fertilization experiments conducted in red salmon areas.

The Pribilof seal harvest was 65,638 skins; 52,597 skins were sold at auction for \$4,849,610.

Research on the Atlantic salmon, shad, and striped bass continued in eastern waters. In the Northwest considerable laboratory research was done on electrical fish-guiding devices to divert salmon into bypass channels, and on other devices to protect young salmon from squawfish.

Instruments which record the passage of fish through underwater orifices, giving the direction of the movement were perfected and put into commercial production. Intensive studies of fish behavior during migration were made at the Fisheries Engineering Research Facility established at Bonneville Dam with the cooperation of the Corps of Engineers. A "sonic tracker," which when attached to a fish sends signals by which the path of the fish can be followed, was developed.

Extensive studies of salmon races were made in accordance with the program outlined by the North Pacific Fisheries Commission.

Studies of the king crab in Bristol Bay, the oyster in Long Island Sound, raft culture for oysters in Massachusetts, soft clam in New England, and the role of chemical elements in the metabolism of marine organism were among the other research projects.

Major attack on the sea lamprey which has ruined fisheries in three of the Great Lakes was centered in Lake Superior where lake trout are still commercially important. All lamprey work was done in accordance with the general program of the International Great Lakes Fisheries Commission.

A new research unit, Ocean Research, located at Stanford University, was opened in September 1955, to study the relationship of climate and ocean conditions to the sudden fluctuations in numbers of commercial fish.

Research continued on sockeye salmon "virus" and on the blue-sac disease.

The lower Columbia River Fisheries Development Program, in its eighth year, brought more evidence of the soundness of that program. Eleven hatcheries have been completed since the program started and two more--at Eagle Creek, Ore., and Carson, Wash.--were nearing completion when the fiscal year closed.

Seal studies indicated that the fur seal is not a salmon predator. Out of 205 stomachs studied during the project only one of them showed any evidence of salmon. Seal hookworm studies were continued.



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IMPORTS AND EXPORTS OF SELECTED FISHERY PRODUCTS, FEBRUARY 1957: Imports: GROUND FISH: Fillets imported in February 1957 totaled 4.5 million pounds as compared with 7.1 million pounds in the same month a year ago. Total imports during the first two months of 1957 were 17 percent less than in the same period a year ago, due to a smaller quantity of imports from Canada.

Blocks and slabs imports during February of 2.5 million pounds were 31 percent less than a year ago. But total imports for the first two months of the year amounted to 9 million pounds, 41 percent more than a year earlier. Imports from both Canada and Iceland increased substantially.

FROZEN TUNA: Imports of 11.8 million pounds during February were 25 percent greater than a year earlier due to a large increase in imports of albacore. Imports of other tuna dropped. Total imports for the first two months of 1957 reached 24.3 million pounds, up 17 percent from a year ago.

CANNED TUNA: February imports of 2 million pounds were about the same as the previous year, but total imports for the first two months of 1957 were 10 percent less than a year earlier.

CANNED BONITO: Imports of 1.3 million pounds in February were 2 percent greater than a year ago; imports for January-February this year were about the same as in the first two months of 1956.

CANNED SALMON: Imports of 725,000 pounds dropped off sharply in February. For the first two months of 1957 imports totaled 5.2 million pounds, 2 percent less than a year earlier.

CANNED SARDINES: February imports of sardines totaled 1.8 million pounds, down 8 percent from a year earlier. Imports for January-February 1957 totaled 3.6 million pounds, about 1 percent less than in the similar period of 1956.

SWORDFISH: Imports during February of 1 million pounds were 10 percent less than in 1956. During the first two months of 1957 these imports of 2.4 million pounds were down 12 percent from that period of 1956.

SHRIMP: Imports continued to decline in February when 4.2 million pounds were received, a drop of 29 percent. During the first two months of 1957 a total of 9.9 million pounds were imported, 33 percent less than in that period of 1956.

LOBSTERS: February imports of 4.1 million pounds were 18 percent greater than a year earlier. Total imports for this year through February were 8.8 million pounds, a gain of 34 percent.

CANNED CRABMEAT: Imports declined in February to 215,000 pounds. Imports for the first two months of this year of 520,000 pounds were 37 percent less than in the same period in 1956.

FISH MEAL: Imports of 5,086 tons in February were 34 percent less than a year ago. Total imports for the first two months of 1957 amounted to 9,305 tons, a decline of 51 percent as compared with the same months in 1956. Reduced imports were noted from all countries.

Exports: CANNED SARDINES: Exports of 2.1 million pounds of canned sardines in February 1957 were 56 percent less than in the same month of 1956. Exports during the first two months of 1957 were 64 percent less than a year earlier. Cuba and Philippines were the principal importers.

CANNED MACKEREL AND JACK MACKEREL: Exports in February of 3.2 million pounds were substantially higher than a year earlier as a result of increased shipments to the Philippines.

FISH OIL: February exports totaled 3.7 million pounds, 65 percent less than in that month of 1956. Total exports for the first two months of 1957 amounted to 20.3 million pounds, down 14 percent from a year earlier. Exports to the Netherlands declined, but a large quantity was shipped to Sweden in January.

TUNA CANNED IN BRINE IMPORTS UNDER QUOTA PROVISIO, JANUARY-MARCH 1957: The quantity of tuna canned in brine which may be imported into the United States during 1957 at the $12\frac{1}{2}$ -percent rate of duty is limited to 44,528,533 pounds. Any imports in excess of that quantity will be dutiable at 25 percent ad valorem.

Imports under the quota from January 1-March 30, 1957, amounted to 8,212,021 pounds, according to data compiled by the Bureau of Customs. This leaves a balance of 36,316,512 pounds of the quota which may be imported during the remainder of 1957 at the $12\frac{1}{2}$ -percent rate of duty.



Wholesale Prices, April 1957

Demand and prices for fresh and frozen fish and shellfish at wholesale held up well during April due in part to the late Lenten season. Generally prices decline in April as supplies increase seasonally and frozen items in good supply are sold off to decrease carryover into the new freezing season. In April this year the overall edible fish and shellfish (fresh, frozen, and canned) wholesale index (119.3 percent of the 1947-49 average) was about unchanged from the previous month, but higher by about 10 percent than for April 1956.

April 1957 wholesale prices for drawn, dressed, or whole finfish were 3.2 percent lower than in March. Higher prices in April for large drawn haddock and whitefish at New York were more than offset by lower prices for yellow pike, halibut, and salmon. As compared with April 1956, this April's index for the subgroup was up 18.8 percent. Higher prices for large drawn haddock and all the fresh-water varieties were responsible for the increase. The Jewish religious holidays in April were responsible for the price increases for fresh-water varieties, but these increases were partially offset by lower prices for dressed halibut (down 13.1 percent) and dressed salmon (down 2.7 percent).

Prices for the processed fresh fish and shellfish items in April 1957 declined 1.6 percent as compared with the previous month due primarily to a decline in shucked oyster prices which was not completely offset by an increase in fresh small haddock fillet prices at Boston. The April 1957 index for this subgroup was 10.9 percent higher than in April 1956.

During April this year prices for processed frozen fish and shellfish increased 9.0 percent over the preceding month because of higher frozen haddock fillet prices (up 5.3 percent) and a rather sharp rise of about 10 cents a pound (13.1 percent) in frozen shrimp prices at Chicago. As compared with April 1956, wholesale prices for the items in this subgroup in April 1957 were higher by 14.5 percent due chiefly to higher shrimp prices (up 25.5 percent). Wholesale prices for frozen ocean perch and flounder fillets were unchanged this April from the preceding month and April 1956.

Wholesale prices for canned fish remained steady during April with only a slight decline (0.03 percent) from March, but an increase of 2.0 percent over April

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, April 1957 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices ^{1/} (\$)		Indexes (1947-49=100)			
			Apr. 1957	Mar. 1957	Apr. 1957	Mar. 1957	Feb. 1957	Apr. 1956
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					119.3	119.4	115.3	108.6
<u>Fresh & Frozen Fishery Products:</u>					132.0	132.0	124.9	115.2
<u>Drawn, Dressed, or Whole Finfish:</u>					119.4	123.4	113.0	100.5
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.11	.10	111.0	100.5	60.7	50.1
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.30	.31	92.3	95.9	105.2	106.2
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.60	.62	134.3	139.3	142.7	137.1
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.92	.79	138.3	195.8	171.1	171.0
Whitefish, L. Erie pound or gill net, rnd., fresh .	New York	lb.	1.12	.90	227.5	182.0	151.7	121.3
Lake trout, domestic, No. 1, drawn, fresh . . .	Chicago	lb.	.80	.79	163.9	161.8	143.4	110.6
Yellow pike, L. Michigan & Huron, rnd., fresh .	New York	lb.	.32	.74	75.0	173.5	152.4	49.3
<u>Processed, Fresh (Fish & Shellfish):</u>					140.4	142.7	132.6	126.6
Fillets, haddock, sml., skins on, 20-lb. tins . .	Boston	lb.	.36	.34	120.8	117.4	88.5	81.7
Shrimp, lge. (26-30 count), headless, fresh . .	New York	lb.	.91	.91	143.8	143.8	130.4	124.8
Oysters, shucked, standards	Norfolk	gal.	5.75	6.00	142.3	148.5	145.4	139.2
<u>Processed, Frozen (Fish & Shellfish):</u>					130.9	120.1	124.4	114.3
Fillets, flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.40	103.4	103.4	103.4	103.4
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.30	.28	92.6	87.9	97.3	91.0
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.29	.29	114.8	114.8	114.8	114.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.94	.84	145.8	128.9	131.2	116.5
<u>Canned Fishery Products:</u>					101.2	101.5	101.5	99.2
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs. .	Seattle	cs.	22.65	22.65	120.0	120.0	120.0	120.0
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.20	11.20	80.8	80.8	80.8	77.1
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	9.00	9.00	105.0	105.0	105.0	86.1
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	cs.	7.70	7.95	81.9	84.6	84.6	89.9

^{1/}Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

1956. Prices for canned pink salmon and California sardines were only nominal as supplies from the past packing season were about exhausted. Supplies of canned tuna were plentiful with the market firm. In order to reduce the carryover into the new season that started April 15, canned Maine sardine prices dropped slightly from March to April. Canned fish prices were somewhat lower than in April 1956.



EVALUATING FROZEN TUNA QUALITY

Experiments conducted in Japan have shown that the quality of frozen tuna can be evaluated by measuring the "internal friction" of the frozen meat. The "internal friction" of the frozen fish meat increases with a decrease in its freshness. On the basis of this finding, an instrument was invented for measuring the quality of frozen tuna.

--Modern Refrigeration, August 1955,



International

JAPAN AND RUSSIA SIGN PACT ON PACIFIC SALMON CATCH

An agreement was signed between Japan and the Soviet Union on April 6 that fixed the 1957 salmon quota for Japan in Northwest Pacific waters this season at 120,000 metric tons or 132,276 short tons. Special limitations were put on the catch in the Sea of Okhotsk and the waters off the Soviet Union's Kamchatka Peninsula, according to press dispatches from Tokyo.

The proposal on the part of the Soviet delegates that Japan recognize the Sea of Okhotsk as part of Soviet territorial waters was withdrawn.

TRADE AGREEMENTS

JAPAN-UNITED KINGDOM PACT INCLUDES FISHERY PRODUCTS: Canned tuna valued at US\$1.4 million can be exported to Britain by Japan under the recently-concluded March 1957 Anglo-Japanese trade and payments agreement. Another new quota is for the import from Japan of canned pilchards, worth US\$84,000.

Certain goods from Japan placed on the open general license include frozen salmon, while imports of canned crab and whale oil will be admissible without restriction of quantity but under open individual licenses (Fishing News, April 5, 1957).

NORTHWEST ATLANTIC FISHERIES COMMISSION

GERMANY ADHERES TO CONVENTION: The proposal for the adherence of the Federal Republic of Germany to the International Convention for the Northwest Atlantic Fisheries has been ratified by the German Parliament--Bundestag. The last formalities of the procedure of the German adherence were expected to be completed in the near future, possibly before the 1957 Annual Meeting.



CHANGE OF PLACE FOR COMMISSION'S ANNUAL MEETINGS: The Commission's decision in its 1955 Annual Meeting to change the 1949 Convention in order to make possible the holding of Annual Meetings in any of the member countries was approved by all ten member governments by their signature in Washington on August 21, 1956. Up to now information has been received from the Depositary Government on the ratification by the following countries: Denmark, Iceland, Portugal, United Kingdom, and Spain.

MESH REGULATIONS FOR COD AND HADDOCK TRAWL FISHERY IN SUBAREAS 3, 4, AND 5: Proposed by the Commission in its 1955 Annual Meeting, mesh regulations for the cod and haddock trawl fishery in Subareas 3, 4, and 5 in the Northwest Atlantic, were accepted by all countries concerned October 1955-December 1956 (by France with reservations as far as chafing gear is concerned). The amendments to these regulations proposed by the Commission in its 1956 Annual Meeting

have up to date been accepted by the following member governments: Canada, France (with the reservation that the chafing gear clause only come into effect from January 1, 1958), Norway, United Kingdom, and the United States. The Depositary Government has further informed the Commission that as the regulations and their amendments have been accepted by the only two countries members of Panel 5, these regulations and their amendments will become effective for all countries concerned from March 26, 1957.

Although the regulations and amendments have not yet become effective for Sub-areas 3 and 4, a number of the member countries are already introducing and enforcing them.

1957 ANNUAL MEETING: The Commission's 1957 Annual Meeting was held in Estoril, Lisbon, Portugal, May 20-25. It was being preceded by meetings of the Committee on Research and Statistics on May 17-18. From May 27 to June 3 a Workshop on Population Dynamics and Gear Selectivity was held as a joint meeting by FAO, ICES, and ICNAF.

Delegations from the member countries participated in the Annual Meeting. Observers were present from West Germany and the U.S.S.R., as well as from various international fisheries organizations. (Commission's Newsletter No. 23, dated April 29, reporting activities during December 1956-April 1957).

Note: See Commercial Fisheries Review, January 1957, p. 56.



Australia

FREEZING FISH AND SHRIMP AT SEA PLANNED: In order to process and freeze fish and shrimp at sea in prepackaged form, a Sydney (Australia) firm has purchased the Gulf of Mexico shrimp freezership Rican Star. Present plans call for an investment of about US\$445,000. The Rican Star (586 tons) is 182 feet long and has a refrigerating capacity of 350 tons. In addition to the freezership, a steam trawler (Mary Cam) was also purchased. The Mary Cam, plus three or four seine vessels, and a number of smaller craft will make up a fleet of catcher boats which will use the Rican Star as a processing mothership.

The head of the Sydney firm stated that the fleet will fish all around the coast of Australia. Processing the fish and shrimp at sea will enable the firm to market only high quality products. It is planned to market the frozen processed fishery products in 7-pound packages and not in consumer-size packages.

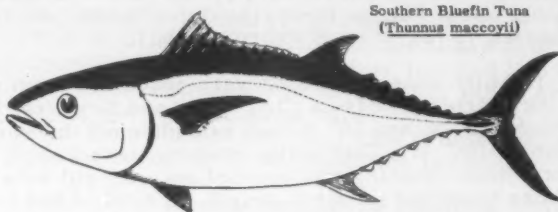
The Rican Star was especially built for freezing shrimp at sea and came to Australia from New York, states the November issue of Fish Trades Review, an Australian fishery publication.

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1956/1957 TUNA SEASON SETS NEW RECORD: By the first week of January 1957, the southern bluefin tuna season off the south coast of Australia's New South Wales had reached the record total of 2,296,000 pounds. The commercial fishery for southern bluefin tuna began in 1949 and in the intervening years the catch has varied from 108,621 pounds in the 1951/52 season to the above total for the 1956/57 season. Final figures for the 1956/57 season, which began in September 1956, will undoubtedly be higher. The ex-vessel or landed value of the tuna catch in 1956/57 was about US\$115,840 or close to 5 U.S. cents a pound.

The record tuna catch was taken within a few miles of the New South Wales coast by a small fleet of bait boats and trollers. It is possible that large tuna re-

Australia's Tuna Landings 1950/51-1956/57 Season	
Season	1,000 Lbs.
1956/57 to 1st week in January	2,296
1955/56	655
1954/55	921
1953/54	1,053
1952/53	536
1951/52	109
1950/51	305



Southern Bluefin Tuna
(*Thunnus maccoyii*)

sources are available to larger bait boats further offshore. The southern bluefin tuna caught in 1956/57 averaged 15-17 pounds each as compared with an average of 25-30 pounds in the previous season. Live bait was reported plentiful in Twofold Bay (Eden) and in the bays near Bermagui. In the Bermagui area there was a run of 6- to 8-pound bluefin tuna and the fishermen reported that the waters "were alive" with striped tuna.

Lack of adequate freezer space at Eden forced the tuna fishing fleet to restrict their catches during the early part of December when the fish were plentiful. This lack of adequate storage space has made the tuna fishery of New South Wales a stop-and-go affair.

Two firms are processing tuna at the present time. One with canneries at Eden and Narooma received about 88 percent of the 1956/57 catch. A smaller firm at Bermagui received the balance and has had some success with smoked "tuna ham" and "tuna chicken." (Fisheries Newsletter of the Australian Commonwealth Director of Fisheries, February 1957.)



Canada

INSURABLE VALUE OF FISHING VESSELS INCREASED: According to an April 1957 announcement by Canada's Minister of Fisheries, fishermen on both coasts are now able to insure vessels up to an appraised value of \$10,000 under the Fishermen's Indemnity Plan of the Federal Department of Fisheries. The previous maximum value of craft eligible for coverage was \$7,500. The minimum remains at \$250.

The increase was approved by the Canadian Government because of the substantial increase in the cost of replacement of the classes of vessels which have been insured under the Indemnity Plan since 1953.

Provision is made for protection against total or partial loss from collision, foundering, storm and other marine perils, and from fire. The annual premium paid by the fishermen who insure their vessels under the plan is one percent of the appraised value of their craft. At the end of March 1957, some 3,900 fishing vessels valued at about \$8,600,000 were covered under the plan.

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NORTHEAST PACIFIC SALMON STUDIES: Field studies carried out by Canada's Fisheries Research Board's Station at Nanaimo, B. C., in 1956 included (1) participation for the first time in exploratory fishing for salmon in the North Pacific to determine their distribution and to obtain samples, and (2) extension of the

work begun in 1955 on young salmon to learn more about their migration from rivers of origin and by means of tagging, their subsequent entry into high seas or coastal fishing areas. Both research projects are connected with the work of the International North Pacific Fisheries Commission, states the Canadian Department of Fisheries Trade News of February 1957.

The high seas operations were conducted from mid-May to mid-September using the chartered vessels Challenger and Key West II within an area bounded by latitudes 42° N. and 58° N. and extending off the North American coast westward to longitude 150° W. Thirty-five stations were fished, 10 of which were revisited a second time. Fishing was carried out with gill nets of varying mesh sizes which at times exceeded a mile in length. A total of 943 salmon was caught: chum salmon were most numerous (37.1 percent) and were followed in order of abundance by pink (26.5 percent), sockeye (21.2 percent), silver or coho (14.7 percent), and king or spring salmon (0.5 percent).

The work on young salmon was carried out from early July to mid-September using the chartered drum seiner Cape Blanco and the Key West II which converted from gill-netting to purse-seining. The areas of operation included Chatham Sound, Dixon Entrance, and the west coast of the Queen Charlotte Islands. Young salmon were caught in each of these general areas and many were tagged, using the "spaghetti"-type tag. The numbers of young salmon tagged according to species were: pink--6,639; chum--979; sockeye--134; and silver or coho--192.

In conjunction with both operations, bathythermograph records of water temperatures, water samples for salinity and total phosphate determinations, plankton samples, and Secchi disc readings for water transparency were also collected in an attempt to relate salmon occurrence to certain environmental factors.

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SOCKEYE SALMON EGGS SHIPPED TO JAPAN: British Columbia sockeye salmon--about 98,000 of them--will soon be swimming in Lake Chuzenji in Japan. The Canadian Department of Fisheries was advised recently that a shipment of eyed sockeye salmon eggs, despatched in mid-January, had arrived safely at the Nikko National hatchery near Tokyo, where they will be retained until ready for planting, that Department's Trade News (February 1957) says.

The gift arose from meetings between Canadian and Japanese scientists working on fishery surveys in the North Pacific Ocean under the International Pacific Fisheries Commission.

Japanese members had mentioned that stocks of Kokanee--a landlocked sockeye--in the lake were diminishing. The Canadians offered to send replenishments.

Eggs were procured from 75 sockeye spawners at Cultus Lake and brought to the eyed stage at the British Columbia provincial hatchery before being sent to Japan.

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1957 PACIFIC HALIBUT REGULATIONS APPROVED: The 1957 Pacific Halibut Fishery Regulations were approved by the Canadian Government by an Order-in-Council dated March 21, 1957. The Regulations were adopted by the International Pacific Halibut Commission at its annual meeting, held in Seattle January 28-31, 1957.



Ceylon

LIST OF FISHERY PRODUCTS IMPORTS PERMITTED FROM THE U. S.: Canned fish, dried or salted fish, and fish fertilizer are included in the list of products that may be imported into Ceylon from the United States. Canned fish and fish fertilizer are allowed to enter Ceylon without restrictions as to quantity, value, or the amount of foreign exchange that can be allotted. Dried or salted fish require an individual license which is issued at the discretion of the Controller of Imports, and permits are granted only up to the value specified in the individual license.

Fish nets are also included in the list of imports that can be imported into Ceylon without restrictions.



Fiji Island

STATUS OF THE FISHERIES: Although there are plenty of fish in the waters around the Fiji Islands, the fishing industry is not organized and a part of the growing demand for fish must be met by imports. Imports of canned fish have increased in value from £F 184,886 (US\$462,000) in 1953 to £F 302,562 (US\$756,000) in 1955.

A company financed by American capital attempted fishing for tuna in Fiji after World War II. Some £F 190,000 (US\$475,000) was spent on research and initial expense and £F 168,000 (US\$420,000) on special vessels and equipment. The fish caught were to have been sent to American Samoa for canning and eventual export to the United States. The company eventually had to abandon operations due to an insufficient supply of fish. The Fijians employed by the company did not know how to fish with long lines and for that reason were unable to catch tuna.

Trocas shell exports have been comparatively high in recent years. Prices continued to rise throughout 1956 and the demand for trocas shell was strong, in spite of the increasing use of synthetics for button manufacture, points out a March 13 despatch from the United States Consul at Noumea.

Note: Values converted at the rate of one Fiji pound equals US\$2.50.



Iceland

EXPORT TRADE BILL EXPECTED TO PASS: The bill calling for reorganization of the export trade has passed Iceland's lower house and it is considered almost a foregone conclusion that it will become law during the current session. It may or may not lead to any significant change in fish marketing arrangements, however. With regard to the salt-fish trade, which is presently handled entirely by one organization and which might have been the one most affected by the bill, the Federation of Cooperative Societies has decided that its best interests lie in continuing to do its selling through the present organization rather than set up a new and competing one. At the recent meeting of the Union of Icelandic Fish Producers it voted together with all other members against the bill and against a change in the present arrangements.

The bill is primarily concerned with the question of marketing and not of production. The Union of Icelandic Fish Producers does not limit the amount of salt fish that a producer may turn out. However, members must undertake not to sell to nonmembers. Since the cooperatives have decided to remain in the organization, it is difficult to envisage any new marketing group acquiring an important role. Conservatives consider this a victory of no mean proportions (U. S. Embassy dispatch dated March 15, 1957).



India

NYLON NETS USED SUCCESSFULLY BY FISHERMEN: The excellent catches made by Indian fishermen using a mechanized boat and nylon nets, demonstrated to them by experts of the Food and Agriculture Organization, Rome, is creating a strong demand in India for modern fishing boats and gear.

An Icelandic master fisherman, who is on an assignment for FAO in Madras State, reports: "During the past month we hired out the FAO 22-foot Danish motor-boat and 14 nylon gill nets to some fishermen in Kilakarai. They have landed 7,628 pounds of fish in 12 days of fishing.

They have been so impressed by the results obtained that they have written a letter to the Fisheries Department of the Madras Government urgently requesting the Department to make available such boats and nets immediately."

The second FAO Danish boat in India, with 14 nylon nets, has similarly been hired out to fishermen at Pamban. They have landed 8,067 pounds of fish after 18 days of fishing.

Before the FAO expert trained these fishermen in the operation of the boat and gear, few of them had seen a mechanized boat. But they have been quick to learn. When they have demonstrated their skill in handling the boat and gear, the FAO expert has hired out the boat and gear to them on contract, charging a commercially-justified share of the catch and has left them to prove for themselves the value of mechanized boats and nylon nets.

"This is the most convincing and practical way to introduce modern boats, gear, equipment and techniques," states the Icelandic master fishermen.

Nylon gill nets can also be used in fishing from local log rafts and small sail or rowing boats. Thousands of such craft in India offer a very good chance of quickly increasing the Indian fish catch if nylon nets can be widely introduced, points out a March 1956 news release from FAO.



Japan

CANNED OYSTER PACK, 1954-57: The pack of Japanese oysters in 1957 will reach about 90,000 cases (vary from 6 to 100 cans to the case)--see table 1. The oyster pack data derived from the records of the Japanese Cannery Association and reported in a January 17 dispatch from the United States Embassy in Tokyo, is incomplete for 1956 and 1957, but estimates are believed to be reliable. The 1956 pack was large and due to a substantial carryover the 1957 pack will be reduced.

Type of Pack	Can's Net Weight	Cans/Cs.	1957 1/2	1956 1/2	1955	1954
	ozs.			(NO. OF CASES)		
Bottled	151 8.8	48	2/	2/	417	9,168
	145 5.1	48	2/	2/	10,663	-
	273 9.6	48	2/	2/	96	-
Total bottled			30,000	19,000	11,176	9,168
	55 1.9	100	2/	2/	443	1,070
	80 3.2	6	2/	2/	480	-
	90 3.2	24	2/	2/	2,500	2,407
	90 3.2	25	2/	2/	138	-
	90 3.2	50	2/	2/	6,084	26,543
	90 3.2	100	2/	2/	57,583	30,994
					564	2,755
Total smoked in oil			80,000	85,000	87,792	63,889
Bottled	2/ 2/	2/	2/	2/	5,821	2,136
Other	2/ 2/	2/	2/	2/	1,312	1,816
Grand total			90,000	114,000	86,101	76,587
1/ Estimated.			2/ Not available.			

Prices for the principal packs of canned oysters f.o.b. Japan for boiled oysters varied between US\$7.30 to 7.90 a case (48 cans of about 5.1 ozs.) from 1954-56 and smoked oysters in oil varied from US\$7.00 to 7.30 a case (50 cases of about 3.2 ozs.) during the same period.

CANNED OYSTER EXPORTS: Japanese exports of canned oysters varied from 59,130 cases

in 1954 to 88,000 cases in 1956. In 1954 the United States imported 68 percent (40,281 cases) and in 1955 about 66 percent (47,217 cases), mostly smoked oysters

Table 2 - Japan's Exports of Canned Oysters

Type of Pack	Can's Net Weight		Cans/Cs.	1957 ^{1/}	1956 ^{1/}	Total			
	GRAMS	OZS.				1955		1954	
Boiled	273	9.6	48	2/	2/	OTHER COUNTRIES	U. S.	OTHER COUNTRIES	U. S.
	187	6.6				1,722	1,240	1,747	1,300
	145	5.1				822	100	3,217	1,350
Total boiled						9,233	8,643	1,477	1,310
				23,000	18,000	11,777	9,983	6,441	3,960
Broiled	2/	2/	2/	2/	2/	2/	2/	25	25
Smoked in oil	90	3.2	50			56,527	35,429	50,656	34,508
	55	1.9	50			2,436	1,635	1,908	1,788
	2/	2/	2/			600	170	100	
Total smoked in oil				55,000	70,000	59,563	37,234	52,664	32,296
Grand total				78,000	88,000	71,340	47,217	59,130	40,281

^{1/} Estimated.^{2/} Unavailable.

in oil. In 1954 smoked oysters in oil made up 90 percent of the canned oyster imports into the United States and about 79 percent in 1955.

COMBINATION LIVE-BAIT AND LONG-LINE TUNA VESSEL BUILT: The Miho Shipyard in Shimizu has launched the first of 6 combination live-bait and long-line tuna vessels ordered by the Omaezaki High-seas Fisheries Association, the No. 1 Nikko Maru (310 tons). This vessel is characterized by its suitability for both types of tuna fishing, and by its large carrying capacity. Hold space is 66 cubic meters (2,331 cubic feet) for frozen tuna, 70 cubic meters (2,472 cubic feet) for iced storage, and 8 cubic meters (283 cubic feet) reserve hold. The ship has an ammonia plant with a freezing capacity of 800 kan (6,600 pounds) a day.

The Nikko Maru has a top speed of 11.5 knots, cruising speed of 10 knots, and 65 days cruising range. Equipment is worthy of a modern fishing boat, including automatic pilot, loran, echo sounder, and a remote sea-water thermometer. Construction cost was US\$330,000. It is expected that the remaining 5 vessels will be completed by August 1957, states the Nippon Suisan Shimbun of February 18.

NEW TUNA FISHING GROUND OFF MARQUESAS ISLANDS REPORTED: The Japanese tuna vessel No. 10 Seisho Maru (720 tons), which sailed from Shimizu on December 20, 1956, has since been working actively in the Southeastern Pacific and has recently reported to Shimizu the discovery of a new tuna fishing ground on the eastern side of the Marquesas Islands. According to this report, the new ground is in the vicinity of 6° S., 126° W. Since January 26, the vessel has been making catches day after day of 4,000-5,000 kans (16-20 tons), which is 2 or 2.5 times the catches made on the Indian Ocean grounds.

The catches are composed of yellowfin and big-eyed tuna and black marlin. The fish are large, mostly 160 to 300 pounds, and it looks as if the fishing may be good there throughout the year, reports the February 18 Nippon Suisan Shimbun.

TUNA FISHING PERMITS TRADED AT HIGH PRICES: Because of the record-breaking catches made along the Japanese Pacific coast last year by tuna seiners, the shipyards of the coastal prefectures are enjoying a seiner construction boom. Because of the desire of the operators to qualify for government financing for these

new seiners, efforts are being made in various fishing ports to buy up tuna fishing permits, according to reports from Aomori Prefecture. Brokers in the neighboring prefectures have already taken a number of permits from that Prefecture, and the Aomori Prefecture Seiners' Association is trying to put a stop to the buying up of these permits, points out the Nippon Suisan Shimbun (February 20, 1957).

TUNA INDUSTRY AND LICENSING SYSTEM PROBLEMS: It is difficult at the present juncture to get an accurate grasp of the state of the tuna resources, and there is no landmark for a new direction in the production end of the industry, according to a Tuna Investigative Committee report, an article points out in the Japanese fishing industry weekly Suisan Shuho (January 25).

Table 1 - Income and Operating Costs of Japanese Tuna Boats

Year	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Tonnage	360	360	360	320	310	240	180	160	160	160	150	80	80	40	30	20	40
Refrigeration	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Period surveyed	1/55- 3/56	1/55- 12/55	1/55- 11/54- 12/55	1/55- 11/54- 12/55	1/55- 12/54- 12/55	1/55- 11/54- 12/55	1/55- 12/54- 12/55	1/55- 11/54- 12/55	8/55- 8/55- 1/56	2/55- 8/55- 1/56	8/55- 8/55- 1/56	8/55- 8/55- 1/56	8/55- 8/55- 1/56	8/55- 8/55- 1/56	8/55- 8/55- 1/56	8/55- 8/55- 1/56	8/55- 8/55- 1/56
Number of trips	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Weight of catch (lbs.)	1,719,755	1,510,470	1,325,615	1,071,055	1,050,310	1,030,450	723,642	629,588	450,128	450,128	574,112	315,048	321,326	197,448	198,368	371,078	300,072
Value of catch (USD)	154,192	119,101	104,669	123,076	102,177	80,743	60,013	61,669	44,567	44,567	47,932	26,642	26,375	16,355	16,355	27,444	18,132
Direct expenses (percent)	35.6	34.8	31.6	33.1	30.1	33.6	44.0	41.0	35.6	35.1	35.1	45.5	46.1	53.5	54.4	37.8	37.1
Sales commissions	6.9	3.0	3.0	3.9	4.8	2.1	5.0	4.3	7.9	6.6	5.8	8.8	6.7	8.5	7.6	3.5	0.4
Trip expenses	31.0	31.5	29.6	29.2	25.3	31.5	39.0	42.7	27.7	32.8	32.3	37.1	39.5	45.4	45.2	24.2	27.2
Crew's share (percent)	21.4	20.0	17.6	20.0	19.7	13.0	14.2	25.2	24.0	17.7	20.6	25.5	14.5	20.4	18.6	18.6	18.6
Indirect expenses (percent)	4.0	4.5	50.0	37.1	50.2	53.4	41.8	27.8	39.5	43.1	44.1	28.6	39.5	35.7	32.8	43.4	43.8
Interest	0.2	0.5	10.0	2.6	9.8	11.2	8.7	1.9	11.4	6.3	7.4	4.8	7.0	4.6	4.1	15.3	12.0
Amortization of ship	20.7	12.1	22.4	20.6	19.9	18.6	6.7	12.7	12.7	9.0	9.0	7.0	9.0	9.0	9.0	9.0	9.0
Other expenses	17.1	17.9	18.2	13.1	20.5	17.7	16.5	19.2	15.4	22.2	27.3	24.4	32.5	31.1	18.9	22.2	24.4
Total expenses (USD)	155,668	117,682	114,729	135,138	120,951	120,951	75,633	65,112	46,743	52,645	62,008	36,660	36,660	25,074	27,332	42,223	33,160
Revenue less expenses (USD)	+ 2,531	+ 1,120	+ 10,050	+ 30,755	- 18,574	- 20,044	- 15,640	- 1,447	+ 425	- 7,884	- 14,071	+ 2,684	- 8,284	+ 1,281	- 78	- 8,856	- 5,009
Month launched and main- rained (U-steel, W-wood)	2/55 S	2/54 S	12/54 S	2/53 S	10/52 S	9/52 S	10/54 S	6/37 1/2 S	5/54 W	6/54 W	2/47 S	12/40 W	5/48 W	9/53 W	5/54 W	6/49 W	6/49 W
Remaining fitting out capital (USD)	92,782	31,699	83,340	None	36,114	3/11,117	74,108	None	51,449	41,670	23,613	None	None	None	6,195	19,140	14,132

However, the drying up of the tuna stocks is already regarded as an actual and growing problem, the assignment of the Japanese Fishery Agency's research ship Shoyo Maru to a survey of tuna grounds in the Atlantic appearing to be in itself an admission that the resources of the Pacific and Indian oceans are declining. Therefore it is probable that when the results of the Atlantic surveys are known, tuna boats cannot be allowed to swarm into that area and catch as much tuna as they can take out of it. The domestic demand for tuna sausage has increased strongly, and a large supply of raw material is desired, but on the other hand the medium and small vessel operators are criticizing mothership-type operations as outrageous. The tuna industry has its problems in the lack of coordination of the resource--production, distribution, and consumption relationships--and unlike other fisheries, these problems are too difficult to be handled simply by a shift of fishing grounds. Therefore, before trying to take a new, over-all view of the "tuna industry," let us first attempt to look at the problems of the present licensing system, while keeping in direct view the actual state of tuna business operations.

From the Operational Point of View the Resources are Declining: It is said that when conservation scientists are listened to, it is generally too late. The time of seeking their opinions has come, and these good people have been dragged into the limelight by the Tuna Investigative Committee. The idea was to get the opinions of the experts, and then to determine the degree of regulation of production. However, the scientists were of two opposite opinions. One is the theory that there is no decline in the tuna resources, and that changes in the fishing conditions are controlled to a greater extent by natural causes than by man's fishing activity. The other opinion holds that changes in catch rates are to be regarded as changes in the resources, and that among the individual tuna species, yellowfin are just holding their own, albacore still offer room for expansion, there is no need to worry about black tuna and big-eyed, but the spearfishes should be watched carefully.

For both of these theories, data with which to elucidate the state of the tuna resources are lacking, and they both lead to the conclusion that "We have not yet reached a stage where we can determine the causes of fluctuations in fishing conditions or

estimate the catch accurately, so at present we should pay very close attention to the trends of the tuna resources," which is no conclusion at all.

However, an entirely different and powerful claim has been put forth. It says that "The tuna resources, from the point of view of fishery operations, are declining. This can be seen by looking at the drop in the average catch rates and the decrease in catch per vessel-ton. The shifts year by year to more distant grounds are also an indication of the decline of the resources in home waters. Even though it be said that biologically the resources are not being depleted, from the standpoint of the operators the falling catch rates, the increasing trip time, and the changes in the value of fishing grounds have to be considered indicative of a decline in the fishery resource."

In short, this is an expression of the thinking on the subject of resources from the point of view of actual fishing operations, as opposed to that of purely scientific study. The same disparity is seen in the views of Japan on the one hand and of the United States and Canada on the other with regard to the investigations of salmon resources under the tripartite treaty, and it is also like the opposition of the views of the Soviet scientists Baranov and Moiseev concerning the North Pacific salmon resources.

Increasing Distance of the Fishing Grounds and the Actualities of Operation: Leaving aside this problem of declining resources, the Japanese tuna fleet, under the encouragement of special legislation (repealed June 8, 1955), has increased in number and size of vessels until the 1955 catch of 361,410 tons was 1.6 times that of the highest prewar year, 1940. Since the repeal of the special legislation, the trend has been toward stricter regulation, but if we look at the cases of individual vessels of the existing fleet, there has been a conspicuous tendency for the rising costs accompanying the fall in catch rates and the increasing distance to the fishing grounds to greatly hinder tuna fishing operations.

At present the tuna fishing grounds can be broadly divided into three--the Pacific, the Indian Ocean, and the Atlantic. Japanese tuna boats are actually working in two of these, the Pacific and the Indian Ocean, and according to operational statistics of vessels fishing in these areas, the catch rates in both are falling year by year. In pursuing the tuna, there is a natural competition to build bigger boats, but the result has been to bring about a vicious circle in which there is not much difference between a 600-ton boat and a 1,000-ton boat. Table 1 gives examples of tuna-boat operations compiled from data gathered during the past year by the Tuna Fishermen's Association on the income and expenditures of 24 tuna boats ranging in size from 30 to 360 tons. From this table it can be seen that about 30 percent of the boats are operating in the red. And leaving out of consideration the cases where boats came into port at a time when fish prices were high, it is indicated that the cause of these unprofitable operations was the trip expenses, that is, the cost of directly consumed material such as fuel. It is shown that among vessels of the same size class, those that made a smaller number of trips went in the hole just that much deeper, and it is clear that in the case of both distant-water and medium-size boats income and outgo were only balanced by making a large number of trips.

Problems of the Present Licensing System: If we look at the problem of the increase in tuna boat size, we can immediately see the contradictions which actually exist in the tuna fishery. And if we dig deeper into the crisis of the tuna fishing industry, it appears--as long as the problem of the resource is not understood--that the root of the trouble is in the present licensing system.

The tuna fishery licensing system in force at present distinguishes four groups: small, medium, distant-water, and mothership-type operations. The fact that there is no consistent policy applied vertically through these four groups gives rise to problems of various kinds. Even the Investigative Committee's report recognized

that "in the regulation of the tuna fisheries, with due regard to the business operations of the industry and to international factors, the system under which the operations of medium-size, distant-water, and mothership-fleet vessels are separated should be reorganized into a coordinated system." This could even mean a departure from present fisheries legislation and the establishment of a distant-water fishing law. However, such legislation could hardly be expected to materialize very soon, and the idea was set aside pending a general reform of fishery laws.

Nevertheless, under present conditions the opposing movements within this fishery will probably grow stronger and stronger. This is because, with regard to the increase in vessel size mentioned earlier, there are many factors which bring about inequities at the producing level in the relationships between medium and large vessels and between single-vessel operations and mothership-type operations.

Now to look at the licensing policies for the four separate types of fisheries. First, for the small coastal boats, the Investigative Committee has recommended giving each prefecture a licensing quota under certain fixed conditions, for the sake of reviving and rationalizing the fishing villages, and since this is also approved by the authorities, we will expect its materialization. For the medium-size boats, whose growth is now blocked at the 100-ton line, steps are to be taken to remove this restriction. In this case a combined vessel replacement system will probably be adopted, taking into account production and consumption and avoiding an unlimited expansion of vessel size. For the distant-water vessels, however, no upper limit has been set. Doubtless improper competition should be restrained, perhaps with a limit set provisionally at the 1,000-ton line.

Conflicts Between Mothership-Type and Single-Vessel Operations: The problem is, of course, in the relationship between mothership operations and those of vessels working singly. It is considered that for the motherships a quota limit of 14,930 tons, like that of last year, will be continued. The dissatisfaction of the mothership companies with this is very great. The Nippon Suisan Company, which last year was held down to 2,150 tons, maintains that it must have at least 3,300 tons to break even. However, there are also the small and medium operators, who are dead set against this mothership-type operation, and the views of the fishermen's association are that, even though it may not be possible to eliminate them altogether, the mothership operations might be continued at the present level if it were part of an over-all policy for the relief of the small and middle-size operators. At any rate, there will be no change in their opposition to any expansion of mothership operations. The cries of the small and medium operators that the motherships should be completely done away with because of the decline of the resources can probably be dismissed as an appeal to emotion, in view of the ratio of their 14,930 tons to the total catch of over 350,000 tons. The source of this opposition is alarm at the subjection of small and medium operators to big capital through the formation of direct connections between individually-operated ships and the mothership companies, which since they are caught in a bind between the growing domestic demand for tuna sausage and the restraint on the catches of their mothership-type fleets, are seeking to get large supplies of raw material from the individually-operated vessels. However, even among the so-called individually operated vessels, some of the large ones working in the Indian Ocean are using boats which they carry aboard or which accompany them and are thus operating in a semi-mothership form, so the whole subject needs re-examination. The problem is whether to put the semi-motherships in with the regular motherships. With single-vessel operations in distant waters becoming gradually more difficult, it is probably a natural development to apply mothership-type techniques in both the Indian Ocean and the South Pacific. There is much doubt, however, as to what course will be taken by the Fishery Agency, which is in somewhat of a dilemma.

Supply Bases as a Means of Overcoming the Crisis: As the fleet has gone farther out in pursuit of the fish, the grounds have become more distant, but there are natural limits to this trend. The boats are fishing in waters around Mad-

agascar, on the east coast of Africa, and in the Arabian Sea, but to go farther than that appears to be unreasonable from a business standpoint.

This would seem to mean that in the present stage we need to set up supply bases near the fishing grounds in order to lighten the trip expenses, which have grown into an unreasonable burden. Industry circles consider that the promotion of plans for supply bases for vessels fishing the Indian Ocean is a project for this year. Their first candidate is the port of Mombasa on the east coast of Africa, and they have initiated negotiations with the ruling power and with the ministries concerned. If this materializes, fuel can be obtained at approximately the same price as at Singapore, and it is considered that fully profitable operations will be possible not only for large vessels but also for boats of the 300-ton class. The only obstacle is the problem of increasing the quota of foreign exchange for fuel oil, and strong efforts are being made at the Finance Ministry to get this done as a measure to overcome the difficulties of the tuna fishing business.

If this is advanced a step further, we come to the stage of agreements for fishing bases, with landings and sales of the catch, amounting to an advance of the tuna fishing industry into foreign territory, but this development is forced to mark time because of the Fishery Agency's administrative policy of holding back foreign-based enterprises which have the export of tuna to the United States as their object. The only hope is for expansion of the European market, but although France and Italy have begun to show signs of activity, it is likely to be a long time before anything important develops.

Early Establishment of Assignment of Fishing Grounds by Vessel Size: One remaining means of breaking through the crisis of the tuna fishery is to develop new fishing grounds by privately-owned vessels, as in the past, the limit of what can be done by private capital has been reached. Great expectations are held for the Fishery Agency's research ship *Shoyo Maru*, and the problem seems essentially to be to get a rapid grasp of the facts concerning tuna spawning grounds, migration of the young, and growth rate.

Mothership-type operations, which cover a ground intensively over a short period of time and clean it out at one crack, will probably be a problem from a conservation point of view, but even aside from mothership operations, it seems desirable in the present stage to hasten the adoption of selective gear and fishing methods and the establishment of a system of assignment of fishing grounds in accordance with the size of the vessels.

This latter point is particularly related to the encouragement of construction of larger vessels, and it should be an extremely effective means of relieving the problem of excess fishing power. With the series of nuclear experiments by the British at Christmas Island coming up, the fishermen's association is planning for a shift to the fishing grounds of the Indian Ocean. This, however, as set forth earlier, will have serious effects on the business operations of the fishery just because of the increased distance to the grounds. At any rate, it does represent a step toward the assignment or rotation of fishing grounds, and if it is accompanied by investigations of the resources, it may possibly lead to a regulative policy which will take into account the business management of the industry.

Is There Little Hope for Effect From the Committee's Report?: The Fishery Agency has, while wrestling with the 1957 budget, had on its hands the matter of establishing tuna policies based on the Investigative Committee's report, but with the decision of the cabinet on the budget, the Agency will at the end of this month at last begin work on this matter.

A conference on tuna export policies which includes persons connected with the markets has already taken up where the Investigative Committee left off in the field.

of exports, and it is known that they are taking up the problem of agreements on ex-vessel prices. However, on the problem of the licensing system, which should be the keystone of tuna policies, there is ample reason to fear that the matter will be passed off with just some partial reforms.

This is because the reform of the fishery laws is many years in the future, and the tuna fishery, which cannot get free of the fishery rights with which that law is so involved, has no hope for any basic reform at an early date.

Although we now have the report which was made as a result of the setting up of a consultative body by the Kono fishery administration, there are those who think it all the more doubtful that this report will be reflected to any extent in administration for the very reason that the tuna fishery does present such important problems.

Don't Shy Away from the Establishment of Policies: Now that 12 years have passed since the end of the war, one feels that all of the problems of the fisheries have come to light and that the time has come to find the way to stability for the fishing industry. As a beginning, the Fishery Agency is going to examine the reorganization of whaling. When the results on that are out, they will get around to the reorganization of other fisheries, but in the case of tuna, as has been said, the internal maladjustments are extremely bad. Although consistent policies running through conservation--production--distribution--and consumption are desired, wherever one touches the structure there are immediate repercussions of opposition between levels, and that is why the authorities shy away from any reforming of the system, let alone seeking new legislation.

The tuna fishery is up against a great wall, and although in this it shares the fate of the fisheries in general, another reason can be found in the length of the period during which it was let go without policies or management. We hope that the Fishery Agency will go deeply into the actualities of the business operations of the fishery, without wasting time on "careful study," and if they see a need for concrete action, that they will go ahead with enough enthusiasm to set up a tuna policy even if it has to be done in the form of an emergency order.



Mexico

MERIDA SHRIMP FISHERIES TRENDS, JANUARY-MARCH 1957: Shrimp exports from Merida, Mexico, during the first quarter of 1957 totaled 3.3 million pounds, all of which went to buyers in the United States, according to a dispatch from the United States Consul in Merida (April 11, 1957).

Average prices for 15-20 count headless shrimp per pound f.o.b. Brownsville, Tex., were reported to be: 70 cents in January, 68 cents in February, and 75 cents in March. Smaller sizes were approximately 5 cents a pound lower for each size grade smaller than 15-20 count. These prices at Brownsville were approximately 20 percent higher than the prices for the similar quarter in 1956.

Total shrimp landings in the Merida area were good, but the catch per boat fell off considerably. This may be attributed to the increased number of fishing vessels. At the moment, there are approximately 40 more fishing vessels under construction at Ciudad del Carmen and approximately 35 more at Campeche.

Due to the rapid depletion of large shrimp on the banks off Campeche, the Mexican Maritime Department has ordered part of the State shrimping fleet to Veracruz and Tamaulipas, where large shrimp are reported more plentiful. In compliance with the order, 20 fishing vessels moved into the new areas and it is anticipated

that several more vessels will also be transferred to those areas, if found to be necessary.

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VERACRUZ FISHERIES TRENDS, MARCH 1957: Catches of fish and shrimp in the Veracruz area were not good at the beginning of the January-March 1957 quarter, but improved at the end of February. Early in March about 660,000 pounds of mackerel were taken near Veracruz and by the end of the month catches were definitely good. The fishermen were receiving about one peso a kilo (about 3.6 U.S. cents a pound) and this price was considered to be high enough to enable the fishermen to make some money. Improvements in the refrigeration plants located in Veracruz, Alvarado, and Frontera may have contributed to the more profitable operations.

During the first quarter of 1957 large brown shrimp have been relatively scarce and the Veracruz area shrimp vessels were catching the smaller less profitable white shrimp found closer to shore (United States Consulate at Veracruz, dispatch dated April 1).

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SHRIMP FISHERY TRENDS, MARCH 1957: Shrimp landings by the Mexican shrimp fleets in March followed the pattern established early in 1957. The catch through March on the west coast is falling behind that of 1956 and the catch on the east coast is greater this year as compared with last year.

The National Cooperative Confederation during March was in the process of negotiating shrimp fishing contracts with the boat owners for the west coast of Mexico. The present contract expired on March 15, 1957. The cooperatives were asking for an increase of 1,345.00 pesos (US\$107.69) a metric ton of headless shrimp. This represents an increase of about 4.9 U.S. cents a pound, headless weight.

At Salina Cruz, Oaxaca (the only area open in March for fishing on the west coast because a closed season is in effect for Lower California, Sonora, Sinaloa, and Nayarit beginning with March 15 and probably continuing through May 15) the boat owners agreed to an increase of 1,125.00 pesos a ton plus an additional 30 pesos a ton when the catch per trip was two tons or more. In addition the boat owners agreed to pay for the loading and unloading of the boats. This represents an increase of about 4.2 U.S. cents a pound (heads-off) when the trip is less than two metric tons and about 4.3 U.S. cents a pound when the catch is two tons or more. The boats out of Salina Cruz in March were averaging less than two tons a trip, states an April 18 dispatch from the United States Embassy in Mexico.



Norway

FISHERIES TRENDS, MARCH 1957: The catch of winter herring by Norwegian fishermen for the season that ended February 15, 1957, amounted to about 786,250 metric tons as compared with 1,166,666 tons for the 1956 season. The 1957 herring catch was utilized as follows: for fresh purposes, 98,570 tons; for curing, 83,918 tons; for canning, 13,015 tons; for fish meal and oil, 581,882 tons; for fishbait, 4,087 tons; and used for domestic consumption, 4,778 tons.

As of the first week in March the spawning cod fisheries continued to be disappointing with bad weather contributing to the lower catch. The catch of cod from the Lofoten fishery was only 7,753 tons, down 5,869 tons from the 13,616 tons landed

in a similar period in 1956. The total catch of cod from all districts up to the first week in March 1957 was 26,413 tons as compared with 44,280 tons for the same period last year. The cod catch has been sold as follows: for drying, 6,280 tons; for curing, 14,691 tons; and 5,442 tons for fresh purposes (Fiskets Gang, March 7, 1957).

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COD FISHERIES TRENDS TO MARCH 28, 1957: Landings of spawning cod continued to be disappointing, especially from the Lofoten Islands area. The total Lofoten cod catch through March 28 was only 14,800 metric tons, as compared with 49,397 tons landed during a similar period in 1956.

Landings of cod from the Finnmark-More og Romsdal districts were close to 43,456 tons as of March 28, or 46,253 tons below the catch of 89,709 tons landed by this date a year ago. The season's cod catch has been sold for the following purposes: 13,041 tons for drying; 22,768 tons for curing; and 7,647 tons for fresh purposes. In addition, 1,815 tons of cod liver oil have been processed and 2,704 tons of cod roe have been either salted, canned, or sold as fresh (Fiskets Gang, March 28, 1957).

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SARDINE ADVERTISING CAMPAIGN IN BRITAIN SPONSORED BY CANNERS: The Norwegian fish canning industry has provided three million kroner (US\$420,000) for a three-year advertising campaign in Great Britain. Industry leaders hope that the Volvo-type agreement for the exchange of Norwegian sardines for British cars will represent a first step in the campaign to win back the British market backed up by the projected advertising campaign.

Before the war, Norwegian sardines were very popular in Britain, about 200,000 cases a year being sold to the British, but postwar sales gave way to British competition.

The British producers are launching a campaign against the sardine-car agreement. A sharp protest to the British authorities is being prepared, in which the agreement is referred to as "dumping," as the sardines are exported at 11.5 percent below the regular price. Norwegian canners, however, maintain that they are not dumping, and that they are selling the sardines at the authorized minimum price, according to press sources quoted by the United States Embassy in Oslo (April 5, 1957).

GOVERNMENT ASSISTANCE TO FISHERMEN PROPOSED: Because of the failure of the Lofoten cod fisheries, many fishermen have suffered severe losses and are unable to finance continued fishing in other waters. The Norwegian Ministry of Fisheries has therefore proposed the appropriation of 7 million kroner (US\$980,000) for loans to fishermen, and 300,000 kroner (US\$42,000) to be added to the Government's Guarantee Fund for Fishermen.



Panama

PINK SHRIMP CATCHES IN 1957 HIGHER: The February 1957 run of pink shrimp (*Penaeus brevirostris*) promises to exceed all past records, according to a March 28 dispatch from the United States Embassy in Panama City. The pink shrimp run, which usually occurs in March, appeared earlier than usual this year. During February the packing firms operated at capacity level for most of the month and at times the smaller firms had some losses due to the heavy volume.

The early dry season accompanied by the strong northeasterly winds brought the pink shrimp into the Gulf within reach of the Panamanian shrimp boats whose maximum fishing depth does not exceed 50 fathoms. The catch in November-January was about 1 million pounds, well above the total catch of pink shrimp in the 1956 season. Catches of the boats increased steadily from the end of January with the height of the season the last half of February. On February 23, some 131,000 pounds (which was estimated to be about 50 percent of the total catch that day) were unloaded by the boats owned by the Cooperative. The daily catches were spotty in March with a sharp reduction in the first week offset by heavy catches around the middle of the month. Several holidays on which the boats did not go out also reduced the total catch for the month of March.

The Cooperative, principal packer in Panama, reports that it was able to handle all pink shrimp offered by independent boats as well as the catch of its own 52 boats. The bottleneck this year was in the unloading of the boats due to the tide. Three tides were required on several of the heavy days to unload the catch and service the boat for its next trip. The company handled as high as 72,000 pounds of packed and frozen shrimp in a single day. Refrigerated storage space of the national abattoir was used to supplement the firm's own plant facilities. The longshoremen's strike which cancelled one round trip of a ship of The Panama Line, regular carrier of shrimp, placed further strain on limited storage facilities. Four shipments totaling around 68,500 pounds of packed and frozen shrimp were sent to Miami by air freight.

Facilities of the three smaller packers are known to have been taxed heavily and some losses were incurred, particularly in the first week of the heavy run. The total amount of pink shrimp packed by the small companies, however, is 4 to 5 times greater than their production in the 1956 season.

The total catch of pink shrimp for the 1957 season may reach 3 million pounds as compared with 600,000 pounds taken in the 1956 season. The pink shrimp were still being caught at the end of March on an average of 15,000 to 20,000 pounds a day. The water temperature, however, was gradually rising and the pink shrimp were expected to return to deep water.



Peru

CANNED BONITO PACK LOWER: Due to a shift in ocean currents, the 1956/57 Peruvian bonito season, which usually ends in April, has been cut short, points out a March 26 United States Embassy dispatch from Lima. Thus the canned bonito pack for this season will probably be at least 100,000 cases less than that of the previous season (estimated to be between 1.4-1.5 million cases).



Portugal

FISHERIES TRENDS, DECEMBER 1956: Sardine Fishing: The Portuguese sardine catch during December 1956 of 9,531 metric tons (value US\$1,663,000 ex-vessel) was better than average and exceeded that for December 1955 by 2,329 tons. The December sardine catch declined seasonally from the November 1956 catch of 16,906 tons.

Sardines purchased by the packing centers during the month amounted to 6,712 tons (value US\$970,000) or about 70 percent of the catch. During December 1955 the canners purchased 4,303 tons. The fresh fish markets in December 1956 took 2,811 tons and only 8 tons were used for salting.

The principal port of landings for sardines in December was Matosinhos with 61 percent of the catch followed by Setubal with 11 percent and Peniche, 10 percent.

Other Fishing: The December 1956 landings of fish other than sardines was confined to 8,233 tons (value about US\$420,000 ex-vessel) of chinchard. Landings previously unreported for October and November 1956 included 170 tons of tuna, 62 tons of bonito, and 1,678 tons of mackerel (Conservas de Peixe, February 1957).

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SARDINE LANDINGS, 1956: Sardines landed in 1956 by the Portuguese fishing fleet totaled 93,172 metric tons, an increase of 11 percent from the 1955 landings of 83,967 tons, points out an April 3 United States Embassy dispatch from Lisbon.

Other species landed by the fleet of 370 boats and from the 13 traps were: chinchards, 33,885 tons (28,233 tons in 1955); anchovies, 4,523 tons (3,918 tons in 1955); other, 32,085 tons (11,162 tons in 1955). The fishing boats alone--excluding traps--accounted for a catch of 93,163 tons of sardines and 66,796 tons of other species.

Of the sardines landed in 1956, 51,202 tons were purchased by canneries and 41,970 tons were purchased as fresh fish for local consumption.

COD FLEET SAILS: The 53 sailing and motor vessels comprising the hand-line cod fleet were assembling in the Tagus River late in March before proceeding next week to the Newfoundland banks, and later to the Davis straits, for the 1957/58 season. The hand-line fishing vessels will have aboard some 4,000 men, mainly dorymen.

The 22 vessels of the cod trawler fleet, with about 1,500 men, preceded the hand-line vessels to the banks. Some units of the trawler fleet left in the latter part of February. The trawlers will return to unload cod cargos during mid-summer, later going to the banks for a second fishing voyage.

The Portuguese cod fleet was reported here to be the largest of the cod fleets, and the fleet this year comprises more vessels and a larger aggregate tonnage than ever before. Modernization of the fleet and the development of improved fishing methods have been achieved along with steady expansion of the industry.

The cod catch rose to a peak of 75,054 metric tons (wet basis) in 1956/57, from 68,537 tons in 1955/56 and 65,238 tons in 1954/55. The total number of vessels (hand-line fishing vessels and trawlers) increased to 75 in the present season from 72 last year and 70 in 1955. The number of fishermen has increased by about 500 since 1954 and there are about 100 additional crew members.

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CANNED FISH EXPORTS, 1956: During 1956 Portugal's exports of canned fish amounted to 62,756 tons (3,302,900 cases), valued at US\$37.4 million, as compared with 63,701 tons, valued at US\$32.4 million, for the same period in 1955. Sardines

in olive oil exported during 1956 amounted to 46,695 tons, down 4,730 tons from 1955.

In 1956 the leading canned fish buyer was England with 12,145 tons (valued at US\$7.1 million), followed by Germany with 8,849 tons (valued at US\$5.1 million), Italy with 8,149 tons (valued at US\$4.8 million), Belgium-Luxembourg with 5,707 tons (valued at US\$3.4 million), and the United States with 5,098 tons (valued at US\$3.9). Exports to the United States consisted of 2,629 tons of sardines, 1,881 tons of anchovies, and 39 tons of tuna.

During 1956 the United States was Portugal's fifth best canned fish customer in terms of quantity (8.1 percent) and ranked fourth (10.5 percent) in value.

Portuguese canned fish exports in December 1956 totaled 13,016 tons (685,000 cases), valued at US\$7.9 million, as compared with 6,477 tons, valued at US\$3.3 million for the same month in 1955.

In December 1956, England was the principal buyer of Portuguese canned fish, followed by Belgium, Italy, and Germany (Conservas de Peixe, February 1957).



Spain

VIGO FISHERIES TRENDS, JANUARY 1957: Fishing: Landings at Vigo during January 1957 amounted to about 7.7 million pounds valued at US\$884,506, a decrease in quantity of about 32 percent as compared with December 1956 and about 17 percent as compared with the same month in 1956. The lower January 1957 catch was partly due to unfavorable weather and uncertainty over the cost of Diesel and fuel oil. In addition, the port authorities were trying to force the fishing fleet to carry adequate life-saving equipment, states a February 6 dispatch from the United States Consul at Vigo.

Small hake (*Merluccius merluccius*) was the principal species landed in January (2.3 million pounds), followed by dollarfish (*Brama raii*) 1.4 million pounds, and horse mackerel (*Trachurus trachurus*) 773,149 pounds. Sardine landings amounted to 289,155 pounds (down from 1.4 million pounds in December). Rough weather held the small sardine boats in port during part of January.

During the latter part of January, as is customary at that time of the year, part of Vigo's long-range fishing vessels moved to ports in the south of Spain, especially to Huelva and Cadiz, for fishing off the African coast during the balance of the winter months. The fleet was expected to return to Vigo during the early part of April, if weather conditions are favorable, for fishing off the coast of Ireland.

Other fishing ports of commercial importance in the Vigo consular district are Marin and La Curuna. The landings for these ports for 1955-56 are as follows:

Portuguese Canned Fish Exports, 1956		
Species	1956	
	Metric Tons	US\$ 1,000
Sardines in olive oil	46,695	26,935
Sardinelike fish in olive oil	5,074	4,142
Sardine & sardinelike fish in brine	2,030	487
Tuna & tunalike in olive oil	2,050	1,651
Tuna & tunalike in brine	338	227
Mackerel in olive oil	5,528	3,295
Other fish	991	415
Total	62,756	37,152

District	1956		1955	
	Quantity	Value	Quantity	Value
	1,000 Lbs.	US\$1,000	1,000 Lbs.	US\$1,000
Marin	19,950	1,649	30,077	1,691
La Coruna 1/	132,076	11,418	117,145	8,621

1/ All ports except El Ferrol.

Fish canning: The fish canneries in the Vigo area operated at a very low level during January 1957. By the end of January, approximately 90 percent of the canneries were idle. The canneries in operation packed small quantities of sardines and dollarfish but were engaged mainly in packing anchovies, received in brine from other parts of Spain. Purchases of fresh fish by the canneries at the Vigo fish exchange amounted to 171,540 pounds during the month as compared with 1,921,051 pounds in December and 815,574 pounds in January 1956. January is usually a slow month for the canneries, but the output this year was far below normal.

Domestic sales of canned fish were practically at a standstill during January 1957. Although this is a normal situation, conditions are different this year because of the uncertainty over prices. It is the general opinion that prices for domestic markets may be increased by at least 15 percent as the result of the new wage scales and other higher operating expenses.

Exports of canned fish were at a low level and, for the dollar areas, were confined mainly to Cuba, Venezuela, and Central American countries. The canneries may not make any great effort to increase exports until they are granted a more favorable rate of exchange. The exchange rate of 33.835 pesetas to the dollar makes it more difficult than ever to meet competition in foreign markets under present conditions.

Note: Values converted at the rate of 1 peseta equals US\$0.0257.

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VIGO FISHERIES TRENDS, FEBRUARY 1957: **Fishing:** During February 1957 landings of fish at Vigo amounted to about 6.6 million pounds, valued at US\$754,767. The February catches represent a decrease in quantity of about 14 percent as compared with the previous month and were about 18 percent under the February 1956 catch. The weather was unfavorable for fishing operations during February 1957.

A closed season for sardines was established from February 15 through April 15, 1957, in the Cantabrian and Northwestern regions. Some fishermen in Galicia (Northwestern region) feel that this measure is not justified at the present time, and that they should be allowed to continue to take advantage of the abundance of sardines in these coasts. However, the official view is that suspension of sardine fishing will help to conserve the existing shoals and increase the future yield. Sardines (scarce during the past 10 years) appeared in great quantities late in 1956 and the early part of 1957, to the extent that what has been known as the "sardine crisis" was considered ended.

Fish Canning: The fish canneries in the Vigo area were practically inactive during February, this is a normal situation for this time of the year. According to the Vigo fish exchange, only 88,164 pounds of fresh fish were purchased by canneries in this area during February as compared with 171,493 pounds during the previous month and 128,564 pounds during February 1956. The main varieties packed were anchovies and dollarfish.

The tinplate situation continues to be the main concern of canneries, and available foreign exchange (20 percent of the value of products exported) is used to buy it. The outlook for an adequate supply of olive oil is good for 1957. Requirements of canneries are estimated at 14,000 metric tons for all of Spain and about 60 percent of this quantity may be needed for fish packing in the Vigo area.

Domestic sales of canned fish continued to be very slow in February. Buyers were probably holding off for possible fixing of prices by the Central Government. The export market continued in a state of flux. Few export sales were made in February. Canneries were waiting for a more favorable rate of exchange and expect to get it. Stocks of canned fish are known to be high.



Surinam

SURVEY OF FISHERIES RESOURCES IN SURINAM WATERS: The Chief of Fisheries, Surinam Department of Agriculture, Animal Husbandry and Fisheries, has informed the United States Consulate in Paramaribo (February 4, 1957) that a survey of Surinam offshore waters will begin in the spring of 1957. The Surinam Government has signed a contract for this work with a United States citizen of Miami, Fla. The shrimp trawler *Coquette*, which will do the job, was expected to leave San Diego, Calif., around March 1, 1957. The contract provides for a three-month survey. The Government is paying US\$18,900 under the contract.

The purpose of the project is twofold: (a) to determine whether large-size shrimp are present in the deeper waters off the coast (on the continental shelf); and (b) learn about what fish may be present in commercial quantities in the same area. It was also indicated that the survey boat might also operate off the French Guiana coast, outside of territorial waters.

The project is part of the Government's effort to assure a continuing shrimp supply for the shrimp-processing plant now established in Surinam.

The plant, which opened last summer to produce frozen shrimp for the United States market, has had difficulties in obtaining a steady supply of the local estuarine-type (small) shrimp. The present shrimp supply is obtained by nets placed in tidal estuaries of the Saramacca and Surinam Rivers. At the same time, the Government wishes to see what fish possibilities there are in addition to shrimp. Up to the present the trawlers available to the Government are too small and underpowered to go out to deep-water.

If the survey indicates that larger shrimp are present, it is expected that the Government would undertake the financing of trawlers large enough to go after the shrimp and perhaps fish that could be used for fish meal to be added to cattle and poultry feeds now being produced for the local market. The prepared feed industry (a private enterprise using imported ingredients plus the local fish meal) has recently tried its hand in the export market.



Sweden

SYNTHETIC MATERIALS FAVORED BY FISHERMEN: Plastic and nylon materials are steadily finding greater use by the Swedish fishing industry, according to the Swedish West Coast Fishermen's Central Association, which reports that nylon thread--short and long fiber thread as well as solid-drawn thread--is ousting cotton yarn as fishing gear material, and that also cordage, buoys, and floats are now to a great extent being made of synthetic materials. This is especially evident as respects trawl floats, and the glass floats are gradually disappearing and being replaced by plastic trawl floats. The weight of a plastic float is about one-third of that of a glass ball of the same size, and its supporting capacity has been found to be considerably greater, states a March 27, 1957, dispatch from the United States Consul at Goteborg.

LARSSON FLOATING TRAWL WINS AWARD. The inventor, Naval Architect Karl-Hugo Larsson, of the Swedish floating trawl (operated by one trawler) was awarded the silver medal at the 1956 International Inventors' Fair held in Paris in 1956.

The floating trawl, which has been named the "Phantom" trawl, has recently won general acclaim for its outstanding qualities. Major advantages of the new trawl are (1) it is specially suited for use in combination with modern echo-sounding devices, and (2) can be operated by a single vessel. When so used for pelagic (mid-water) trawling it gives most effective fishing results, and the young fish and spawn are spared.

The "Phantom" trawl has undergone protracted tests by fishery experts and fishing authorities in most North-European countries, who have given it their full approval. Larsson, who has experimented since 1944 with this new type of trawl, based his construction on scientific hydro-dynamic designs and tests at the Swedish State Shipbuilding Tank in Gothenburg.

The usual bottom trawl boards are not very effective for keeping the mouth of the trawl open laterally. Sometimes pelagic trawling is done by two vessels using no trawl boards, but this system has many drawbacks. It can only be used by small vessels, control of the size of the catch is difficult, and the trawl is subject to heavy strain when used in that way. However, after having tried some 15 different models, the inventor designed a "floating wingboard," which moves through the water without touching the seabed. The shearing effect is just about twice that of an ordinary board, and it moves steadily through the water.

During the experiments it was found necessary to make some arrangements for increasing the height of the mouth of the trawl net. After much experimental work the inventor succeeded in designing a self-stabilizing shearing-plane, the so-called "trawl-toad," which can be attached to the headline and footrope by single ropes and works quite automatically. The shearing effect of the wingboard and trawl-toads increases with the square of the speed, which means that the mouth of the trawl net stands well open.

The echo-sounding devices, originally designed for locating submarines during World War II, which are now available for fishing purposes, make conditions for pelagic trawling very good at present. The new type of trawl net seems to be the technical solution of the problem of overfishing in the North Sea, as it leaves the young fish and the spawn unmolested at the greater depths. An incidental advantage is that the design of this trawl obviates the difficulties of being caught in obstructions at the bottom.

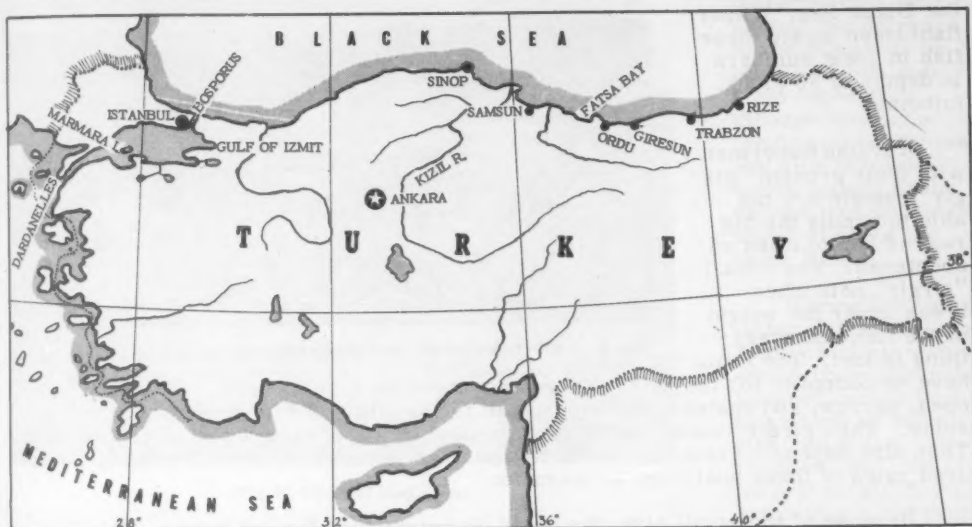
Outstanding practical experience has been gained with the use of the new trawl net in combination with echo-sounding instruments. As an instance it may be mentioned that the biggest catch so far recorded was made by the Swedish trawler *Patricia*, which caught 7 tons of herring in a $\frac{1}{2}$ -hour haul. (The Swedish International Press Bureau, March 30, 1957.)



Turkey

FISHERIES OF BLACK AND MARMARA SEAS: Turkish waters are richly endowed with fishery resources, according to the author who directed a purse seine technical assistance program in Turkey for the International Cooperation Administration. The author and his three assistants (all from California) were sent to Turkey in May 1955 as purse-seine specialists to work with the Turkish Meat and Fish Administration in organizing California-type purse-seine fishing and investigate

the pelagic fish resources in Turkish waters. At the end of the first year, two of the assistants returned to the United States, but the author and one assistant remained until December 1956.



Exploitation of Turkish fishing waters is now carried on largely by private fishermen using small equipment and rather primitive methods. One of the principal fishing methods is the "girgir" system--small boats which operate in pairs trolling with a net. Much of the fishing for the larger species is done by line.

For the investigation, a steel hull German dragger (Sazon) vessel was supplied, which had to be converted to purse-seining. Finally, the vessel (71 feet long with

a beam of 19 feet) was converted after many delays. During the conversion, four purse-seine anchovy nets from the United States west coast were overhauled and mended, local fishing conditions were observed, and purse-seining was explained to the fishermen.



Fig. 1 - Schools of bluefin tuna follow anchovy in the Black Sea.

facilitate the handling of fish. Processing and marketing facilities are lacking. Although the refrigeration plant in Istanbul can handle 100 tons of fish a day, it has no conveyor system for unloading boats and such unloading must be done by hand labor.

An extended trip along the Black Sea coast was made by the author and his three assistants to observe fishing methods and the types of fish landed.

Fishing in Turkey is seasonal and for some reason there are sharp year to year fluctuations in the quantity of fish in Turkish waters. Freak runs are very common, particularly among some types. This is especially true of the pelagic fish found in the Black Sea and the Sea of Marmara. The most abundant is the bonito which are thought to spawn in the Marmara

It is believed that refrigeration facilities are available, but minor additions are needed to

Sea. They are found in the Marmara during certain seasons from spawning size up to six pounds. Supposedly these fish spend the winter in the depths of the Marmara and migrate in the spring to the feeding grounds of the Black Sea. Winter fishermen locate these fish in great numbers in depths of 30 to 60 fathoms.

Turkish fishermen with their present "girgir" system are not able to handle the big runs of bonito often encountered. Their frail "girgir" nets often break under the weight of the fish and everything is lost. The boats have no booms to lift the nets. Everything must be done by hand. The boats are open, narrow, and unstable in choppy seas for handling heavy weights over the sides. The "girgir" boats, which operate in pairs, are often towed by motor boats. They also depend a great deal on their own oars to move around. Probably a hundred pairs of these boats are in operation.

Because of the small size, the boats do not venture far out to sea. They have two main fishing grounds. One around the entrance to the Bosphorus (connects the



Fig. 2 - A 400- to 500-ton school of bluefin tuna sighted in Turkish waters.



Fig. 3 - A school of about 200 tons of tuna in the Gulf of Mudanya.



Fig. 4 - A closer view of a school of bluefin tuna.

Black and Marmara Seas) on the Black Sea side and the other in the Marmara Sea. Several species of fish migrate regularly back and forth between the Marmara and Black seas. They accumulate in the autumn around the entrance of the Bosphorus on the Black Sea side as they come down from the Black Sea feeding grounds on the way to the Marmara. During this period fishermen concentrate their attention in the area around the entrance to the Bosphorus on the Black Sea side. Later fishing operations are transferred to the Marmara. In the spring the fish return to the Black Sea. The favorite fishing grounds appear to be between Sinop and Trabzon where anchovies are found in abundance. Large concentrations of bonito can be found here, particularly during July, August, and September. My colleagues and I observed large numbers there in August 1955. We saw local fishermen catching the bonito which often were observed in large schools. Bluefin tuna, Spanish mackerel, and "lufer" were also observed in abundance along this coast. Anchovies appeared to be rather scarce in 1955 and small in size.

The tuna have much the same habits as the bonito. In the spring they migrate to the Black Sea feeding grounds and in the winter they return to the Marmara. All



Fig. 5 - School of bluefin tuna.

Most of the fish were large and fat having just returned from the summer feeding grounds. Bonito may run up to 7 pounds each in weight. These fish stay rather fat for several months after they come down from the feeding grounds, but in the spring when they again migrate to the Black Sea they are very lean.

The Turkish name for the larger bonito is "torik" and for the smaller one "palamut." These fish are not weighed but are counted in pairs. Annual landings of these fish vary considerably, according to records which have been kept for the last 25 years. There have been poor years in which

only 200,000 pairs or less were landed. In average years from one million to two million pairs were landed. In especially good years, as, for instance during the last two years, nearly 5 million pairs were landed annually. These increased landings are undoubtedly due in part to improved equipment such as better nets and bigger boats. Catches could still be greatly increased, however, by using heavier and stronger nets, but this would require a provision for lifting the nets mechanically rather than by hand as is now done. At present 25 men are used on a pair of "girgirs." The prevailing attitude is, if 25 men are not enough then get 50 men. In addition to being inefficient, this method is very tiring. A modern purse-seine boat with a crew of 11 could handle

three species mill around the entrance to the Bosphorus on the Black Sea side from September through November, feeding on anchovies and blue mackerel which appear at the entrance of the Bosphorus at about the same time.

During this time fishermen make some heavy catches--anywhere from several hundred metric tons to as high as 800 or 900 tons a day. In October 1956, the largest single day's catch was 1,000 tons.



Fig. 6 - German-built steel-hull dragger converted for purse-seining in Turkish waters hauling in the purse seine.

100 tons of catch much easier than the 25 men fishing under the "girgir" system could handle 25 tons of catch. The life of a "girgir" fishermen is full of hardship. He is constantly exposed to weather and sea and since he has no protection except for a raincoat, he is usually wet through. There are 18 oars manned by 9 men on each boat. The crews have no hot meals. Practically all of the fishing is done at night. For light they use cotton waste soaked with cheap oil and tied to the end of a stick which is held over their heads. The most important thing which these fishermen have in their favor is weather, which is very good compared to other fishing areas of the world.

The blue or green mackerel is found mostly around the entrance of the Bosphorus on the Black Sea side. This mackerel is found in large schools chiefly from October through December. They are slender, not very big, but excellent to eat. His brother mackerel, or "kolyoz," is found mostly around the Dardanelles in the Sea of Marmara from June through August. This fish is a pale green in color and somewhat larger than the blue mackerel. This species is usually salted. Most of the catch is purchased by the Greek fishermen who come to the fishing grounds in season in their boats. There is a small cannery on Marmara Island which cans and salts small quantities of fish--mackerel, sardines, and anchovies.



Fig. 7 - Hauling aboard the *Sazon* a bluefin tuna caught with a purse seine in Turkish waters.

in small schools. Anchovies are not as abundant in the Marmara as they are in the Black Sea, however.

One of the most interesting observations in connection with the Black Sea trip was the caviar-carrying sturgeons observed in the Kizilirmak and Yesitirmak Rivers. The author spent several days with an interpreter in the mouth of these rivers observing the sturgeon fishing. The caviar from the sturgeon fetch fabulous prices on the market and the meat is also very good. With the present methods employed, sturgeon fishermen are taking only a fraction of the quantity they could take from the mouth of these two rivers. The camps of the fishermen are located at the entrance to the rivers and sometimes the fishermen are isolated for a week or ten days because of the weather. The caviar is salted and preserved, but the meat, which is very good quality, is discarded. The sturgeon come into the rivers to spawn in the early summer.

The mackerel are usually found running in small schools, ranging anywhere from 2 up to 6 or 8 tons. The fishermen fish for the mackerel day and night. Sardines are also found around Marmara Island, which is near the entrance to the Dardanelles. They are excellent quality, similar to European sardines and very good when salted properly. The sardine season runs for four months from July through October. Fishermen fish for sardines mostly at night with a light. The sardines are found in small schools, usually of not more than two or three tons. These sardines are also fished with beach seines and gill nets.

Anchovies are found more or less in the same area as the sardines and likewise

The "lufer" fish look like Atlantic bluefish or Pacific Coast blue perch. It is a very good fish to eat and it has been observed that the "lufer" follow the same migratory habits as the bonito. Tuna are mostly the big bluefin tuna. This fish also goes back to the Marmara in the fall. There are also other species of fish found on the Black Sea coast, particularly where the anchovies are found. Spanish mackerel ("istavrit") were observed running in large schools and the fish are quite large in size. From this coast are also taken the famous red mullets ("barbunya"). The present harbor facilities along this coast are limited, but with the completion of the breakwater at Samsun Harbor, Samsun will undoubtedly become a center of fisheries development. It is strategically located and if developed should rival the Bosphorus as the fishing center in Turkey. The Bosphorus undoubtedly will remain the greatest fishing center in Turkey because of its two very rich fishing grounds on either side—one in the Marmara Sea and one at the Black Sea entrance. At present the catch is limited because of the primitive equipment and methods employed. Considerable tuna are caught, for example, by hook-and-line fishing, particularly the bluefin which come in large sizes. Bluefin are also caught in a few traps along the Bosphorus, up to 200 or 300 tons in some years. I saw one bluefin tuna which tipped the scales at 1,100 pounds. Better facilities for receiving fish from these grounds are needed some place on the Bosphorus. At present fishermen are sometimes out for periods up to 30 hours. The first fish caught are thrown into the bottom of the boat with additional layers added later as more catches are made. Since no ice is carried, the result is that the first layers of fish have often already started to spoil by the time the boats return for unloading. This is particularly true in warm weather when no protection from the warm sun is provided. Facilities for preserving and handling fish at present are inadequate when large catches are made. I have observed personally large quantities of fish which have been allowed to spoil and were thrown away because the catch was greater than the marketing and handling facilities available to care for them.

The use of explosives to kill fish is also a common practice in various places along the Turkish coast.

The investigation vessel Sazan was not ready for work until April 1956. It was not until this date that the author and one assistant sailed to train Turkish fishermen in purse seining. The net was one of the type used for anchovies. The Turkish fishermen demonstrated they were anxious to learn. After two days, few additional alterations proved necessary, however, and the vessel docked. The vessel was again ready in mid-June 1956. During June and July we made trips to the Marmara Sea to do some exploring for fish and to make observations of casts. Around Marmara Island we saw a number of schools of small anchovies, also schools of small sardines, a few schools of tuna and several hundred schools of medium bonito. Our net was too small to be very successful in catching bonito, but we did catch one ton of medium-size bonito. In late July we set out for the Black Sea. We traveled up to the eastern end beyond Trabzon to Rize. The weather was excellent but few fish were sighted except between Sinop and Trabzon. In the section of the coast between Sinop and Trabzon we saw many fish. In the famous bay of Fatsa, which is the main point at which anchovies gather and on up to Ordu and Giresun, we found abundant fish. On many occasions one could see as many as 10 to 15 schools of fish at one time. Most of these schools were large bonito, but quite a few schools of "lufer" and Spanish mackerel were also observed. The anchovies were abundant but they were small, in fact too small for our mesh. We were able to give the crew much practice in handling a purse-seine net. Our net, however, was too light and too small to use for catching bonito. These were frequently seen in schools of 20 to 30 tons. This trip lasted 22 days, including four days at the Port of Trabzon. This is a very excellent port and we obtained much useful information regarding the fishing industry along this part of the coast. When we returned to Istanbul, our nets had to be cleaned and dried. Our net was treated with a tanning preservative. Nets treated in this manner cannot stay wet too long.

Again, after a few adjustments, we returned to the Black Sea to fish in the entrance of the Bosphorus. We found the fishing very good at night. In early October we transferred to the Gulf of Ismet in the eastern end of the Marmara. Here we saw numerous schools of small sardines, medium-size bonito, and quite a few schools of small anchovies. The most impressive sight, however, was the abundance of tuna. We cast our net in one school that must have been at least 100 tons in size. The fish averaged about 60 to 70 pounds each. We cast our net in this school to prove that tuna could be caught with purse-seining, which is not believed by Turkish fishermen. We must have encircled 60 to 70 tons. Our net was, of course, too weak to hold the catch and in the end we managed to save only about 4 tons. The net was, of course, badly damaged, but we had proved our point that tuna could be caught with purse-seine nets.

Based on my observations and the information which I collected, the Gulf of Ismet is an ideal fishing ground for tuna, particularly in late autumn. Weather is perfect for fishing and there is hardly any current. We continued during October to fish in the Marmara Sea and large schools of tuna were observed in several other areas of the Marmara. A number of schools of sardines or small anchovies were located with echo-sounders. We had the greatest success in catching these fish at night since our net was so small we could not cast deep enough to fish in the daytime.

We continued our fishing throughout November in the Bay of Indjir Liman. In no other place in Turkish waters did we see so many tuna. There must have been up to 500 tons in one school. Although we gave the crew much practice in casting and using the purse-seine nets, our catch of fish was on the whole disappointing. As pointed out earlier, our net was entirely too weak and too small to use for bonito and the tuna. On the other hand, most of the anchovies were too small to be held in the net. They ran in size from three up to 7 or 8 centimeters (about three inches). Since the mesh of our net was one-half inch, it did not hold anchovies smaller than about 9 centimeters. We were told that up to two years ago the anchovy run was much bigger. It appears to be a fact, however, that the fish in Turkish waters run in unpredictable cycles.

Notes: Based on an original report by Samuel J. Braco which was edited by Irwin R. Hedges, Chief, Office of Food and Agriculture, U. S. O. M., Turkey.



--BY SAMUEL J. BRACO, IN CHARGE OF
TECHNICAL ASSISTANCE PROJECT FOR
PURSE-SEINE FISHING IN TURKEY

United Kingdom

FIRST SHIPMENT OF AUSTRALIAN SHRIMP: The first consignment of frozen Australian shrimp was expected to arrive at Southampton, England, about the middle of April. The shrimp were packed by the Queensland (Australia) Fish Board and were consigned to a Grimsby, England, distributor, according to the March 29 Fishing News.

The manager of the Grimsby firm stated that the demand for shrimp or prawns is always greater than the supply in England. He also stated that earlier small sample shipments of shrimp were good quality, and on the basis of these samples a larger consignment was ordered.

* * * * *

SUBSIDIES FOR FISHING INDUSTRY, 1939-57: British Government subsidies provided for fishermen in near and middle waters, including inshore fishermen,

since 1939, total close to US\$58.5 million, according to a statement by the Minister of Agriculture and Fisheries (The Fishing News, April 5).

This total is made up as follows: Grants under the Herring Industry Act, 1944, for provision of boats and equipment (United Kingdom) 1946-1953, US\$1,120,000; grants under the Inshore Fishing Industry Act, 1945, boats and equipment, Great Britain 1946-1952, US\$2,240,000; grants under the White Fish and Herring Industries Act, 1953, boats and engines (Great Britain) from 1953 to date (including estimate for 1956/57), through White Fish Authority, US\$9,240,000, through Herring Industry Board, US\$560,000; subsidy to White Fish Industry (United Kingdom) from 1950 to date (including estimate for 1956/57), US\$38,680,000; grants to the Herring Industry Board, respecting the Herring, Oil and Meal Scheme from 1948 to date (including estimate for 1956/57), US\$7,280,000.

* * * * *

FISHING FLEET SUBSIDIES EXPECTED TO END BY 1961: The British Government hopes that the fishing industry will be in need of no more subsidies by 1961, the Minister of Agriculture stated during a debate (March 12) on the White Fish and Herring Industries Bill.

The White Fish and Herring Industries Bill extends the period subsidies will be paid to the white fish industry up to May 1961, to provide grants for the conversion of coal-burning vessels up to 140 feet in length to oil, and to provide a new subsidy to herring fishermen.

In the course of the debate on the bill it was revealed that experiments had been carried out with an aircraft carrying a fish finder. The tests were made with a transducer pulled through the water by the airplane. It is believed that an airplane with a fish finder can cover a wide ocean area in a few hours. Once herring have been located by the airplane it will stay with them until the drifters at sea can make a haul, states The Fishing News (March 15, 1957).

* * * * *

ECHO-SOUNDER EQUIPPED HELICOPTER FOR FISH FINDING TESTED: Fish-finding experiments by helicopter have proved that shoals and their extent can be tracked with an airborne echo-sounder.

Following technical trials (by an air charter firm and a manufacturer of echo-sounding equipment), technicians felt completely satisfied with a helicopter-borne version of an established fish-detecting device. These tests may revolutionize fisheries that are seeking ways and means to locate fish schools between the surface and the sea bottom. If practical fishing trials bear out the preliminary tests, one airborne echo-sounder could lead trawlers to midwater fish schools and reduce the time wasted searching for a favorable spot. On the other hand, practical fishing tests (which will include the economics of the project) may prove that application to the commercial fisheries is not feasible.

In the autumn of 1956 a trial installation of an echo-sounder was made in a helicopter. To obtain an underwater reading equivalent to that obtained from echo-sounders installed on vessels, special bomb-shaped submarine gear was designed to be suspended 20 feet from the aircraft and towed through the water up to 50 knots, the March 22 issue of The Fishing News points out.

Early in 1957, trials off the English south coast established that underwater noise resulting from the downbeat of the helicopter rotors on the surface of the water do not affect the echo characteristics shown on the screen.

The tests also proved that noise arising from the travel of the submarine body through the water at a convenient cruising speed presented no major problem. Some difficulty was, however, encountered in the mechanical problems associated with the towing of the body at speeds in excess of 30 knots.

Subsequent redesign of the submarine gear, and extended trials under different weather conditions enabled the technicians to overcome this problem. Arrangements are now being made to install the equipment in a lighter and more-economical helicopter so that trials can be made under actual fishing conditions in cooperation with vessel owners.

Although the installed equipment is capable of fish detection as efficiently as in its more conventional form, its value from the fisherman's point of view cannot be assessed until full working trials have taken place.

An aircraft operating from a shore base within economical range of seasonal fishing grounds can conduct a search of a large area in a short time and make available information on shoal location to a number of fishing vessels.

Similarly, in principle, a shipborne helicopter operating in fishing grounds in distant waters can conduct a high-speed search to serve a fishing fleet.



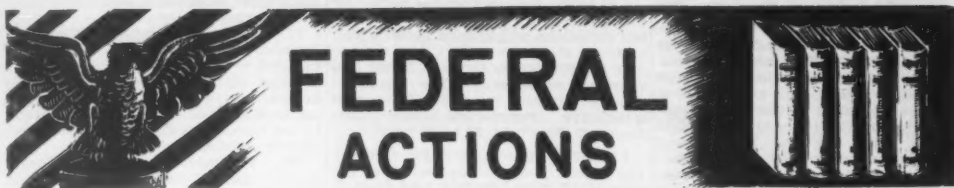
PORGY AND THE POGY NOT THE SAME FISH

The name "porgy" is used for any of the porgy family (Sparidae), a spiny-finned group of marine fishes with strong teeth. The commonest of the group is the scup or northern porgy (*Stenotomus chrysops*), which is known along the Atlantic Coast from South Carolina northward to Maine.

While the porgy is sometimes called "pogie," the name "pogy" refers to the menhaden or mossbunker (*Brevoortia tyrannus*). This member of the herring family (Clupeidae) is a soft-spined fish with no teeth.

The porgy has some food value while the menhaden is rarely eaten. The latter is of great economic value, however. It is rich in oil, and about 1.3 billion pounds are caught in the United States each year for the manufacture of fish meal and oil. The meal is used to fortify poultry and hog feeds, and the oil has many industrial uses. The menhaden occurs from Nova Scotia to northern Florida and the Gulf of Mexico.

--Sea Secrets, The Marine Laboratory,
University of Miami, Coral Gables, Fla.



Department of Agriculture
AGRICULTURAL MARKETING SERVICE

NOTICE ON PROPOSED STANDARDS FOR GRADES OF FROZEN RAW BREADED SHRIMP: The notice of proposed voluntary standards for grades of frozen raw breaded shrimp was published in the May 18, 1957, Federal Register. The notice as published was as follows:

DEPARTMENT OF AGRICULTURE

Agricultural Marketing Service

[7 CFR Part 52]

UNITED STATES STANDARDS FOR GRADES OF FROZEN RAW BREADED SHRIMP¹

NOTICE OF PROPOSED RULE MAKING

Notice is hereby given that the United States Department of Agriculture is considering the issuance of the United States Standards for Grades of Frozen Raw Breaded Shrimp pursuant to the authority contained in the Agricultural Marketing Act of 1946 (60 Stat. 1087 et seq., as amended; 7 U. S. C. 1621 et seq.). These proposed grade standards are recommended by the Fish and Wildlife Service, U. S. Department of the Interior, based on data developed by that agency. These standards, if made effective, will be the first issued by the Department of grade standards for this product.

All persons who desire to submit written data, views, or arguments for consideration in connection with the proposed standards should file the same with the Chief, Processed Products Standardization and Inspection Branch, Fruit and Vegetable Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D. C., not later than 60 days after publication hereof in the FEDERAL REGISTER.

The proposed standards are as follows:

PRODUCT DESCRIPTION, TYPES, AND GRADES

- Sec.
52.3601 Product description.
52.3602 Types of frozen raw breaded shrimp.
52.3603 Grades of frozen raw breaded shrimp.

STYLES AND SIZE DESIGNATIONS

- 52.3604 Recommended styles of frozen raw breaded shrimp.
52.3605 Recommended size designations and counts per pound.

FACTORS OF QUALITY

- 52.3606 Ascertaining the grade.
52.3607 Evaluation of the unscored factor of flavor and odor.
52.3608 Ascertaining the rating for the factors which are scored.
52.3609 Appearance.
52.3610 Defects.
52.3611 Character.

DEFINITIONS AND METHODS OF ANALYSIS

- 52.3612 Definitions and methods of analysis.

LOT CERTIFICATION TOLERANCE

- 52.3613 Tolerances for certification of officially drawn samples.

SCORE SHEET

- 52.3614 Score sheet for frozen raw breaded shrimp.

AUTHORITY: §§ 52.3601 to 52.3614 issued under sec. 305, 60 Stat. 1090, as amended; 7 U. S. C. 1624.

¹ Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug, and Cosmetic Act.

PRODUCT DESCRIPTION, TYPES, AND GRADES

§ 52.3601 *Product description.* Frozen raw breaded shrimp are clean, wholesome, headed, peeled, and deveined shrimp, of the regular commercial species, coated with a wholesome, suitable batter and breading. They are prepared and frozen in accordance with good commercial practice and are maintained at temperatures necessary for the preservation of the product. Frozen raw breaded shrimp contain not less than 50 percent by weight of shrimp material.

§ 52.3602 *Types of frozen raw breaded shrimp—(a) Type I, Fantail—(1) Subtype A.* Split (butterfly) shrimp with the tail fin and the shell segment immediately adjacent to the tail fin.

(2) *Subtype B.* Split (butterfly) shrimp with the tail fin but free of all shell segments.

(b) *Type II, Round fantail—(1) Subtype A.* Round shrimp with the tail fin and the shell segment immediately adjacent to the tail fin.

(2) *Subtype B.* Round shrimp with the tail fin but free of all shell segments.

(c) *Type III, Split.* Split (butterfly) shrimp without attached tail fin or shell segments.

(d) *Type IV, Round.* Round shrimp without attached tail fin or shell segments.

§ 52.3603 *Grades of frozen raw breaded shrimp.* (a) "U. S. Grade A" is the quality of frozen raw breaded shrimp that possess a good flavor or odor, that possess a good appearance, that are practically free from defects, that possess a good character, and that

for those factors which are rated in accordance with the scoring system outlined in the following sections the total score is not less than 85 points: *Provided*, That the frozen raw breaded shrimp may possess a reasonably good appearance and a reasonably good character if the total score is not less than 85 points.

(b) "U. S. Grade B" is the quality of frozen raw breaded shrimp that possess a reasonably good flavor and odor, that possess a reasonably good appearance, that are reasonably free from defects, that possess a reasonably good character, and that for those factors which are rated in accordance with the scoring system outlined in the following sections the total score is not less than 70 points: *Provided*, That the frozen raw breaded shrimp may fail to possess a reasonably good appearance and fail to possess a reasonably good character if the total score is not less than 70 points.

(c) "Substandard" is the quality of frozen raw breaded shrimp that fail to meet the requirements of "U. S. Grade B."

STYLES AND SIZE DESIGNATIONS

§ 52.3604 *Recommended styles of frozen raw breaded shrimp—(a) General.* Styles refer to the several ranges of amounts of coating commonly applied to frozen raw breaded shrimp, the specific range of coating, or style, to be determined by the method described in § 52.3612. The recommended styles are not incorporated in the grades of the finished product since coating content, as such, is not a factor of quality for the purposes of these grades. For ease of marketing, the following descriptive style designations are recommended:

(b) *Style 1: Light breading.* The average coating content of the frozen raw breaded shrimp is not more than 35 percent of the total weight of the frozen raw breaded shrimp.

(c) *Style 2: Medium breading.* The averaged coating content of the frozen raw breaded shrimp is more than 35 percent but not more than 45 percent of the total weight of the frozen raw breaded shrimp.

(d) *Style 3: Heavy breading.* The averaged coating content of the frozen raw breaded shrimp is more than 45 percent but not more than 50 percent

of the total weight of the frozen raw breaded shrimp.

§ 52.3605 *Recommended descriptive size designation and counts per pound.* (a) The recommended descriptive size designations and counts per pound of frozen raw breaded shrimp are not incorporated in the grades of the finished product since size designations and counts per pound, as such, are not factors of quality for the purposes of these grades. The degree of uniformity of size among units of the finished product is rated since it is a definite factor affecting the quality of the cooked product.

(b) For ease of marketing, the following descriptive size designations and counts are recommended:

RECOMMENDED SIZE DESIGNATIONS AND COUNTS PER POUND

Descriptive size designation	Count of breaded shrimp per pound
Colossal.....	15 or under.
Jumbo.....	16-20.
Extra large.....	21-25.
Large.....	26-30.
Medium.....	31-35.
Small.....	36 and over.

FACTORS OF QUALITY

§ 52.3606 *Ascertaining the grade—(a) General.* In addition to considering other requirements outlined in the standards, the following quality factors are evaluated in ascertaining the grade of the product:

(1) *Factor not rated by score points.* Flavor and odor.

(2) *Factors rated by score points.* The relative importance of each factor which is rated is expressed numerically on the scale of 100. The maximum number of points that may be given such factors are:

Factors:	Points
Appearance.....	30
Defects.....	40
Character.....	30
Total score.....	100

(b) The grade of frozen raw breaded shrimp is determined by observing the product in the frozen and thawed states and after it has been cooked in a suitable manner.

§ 52.3607 *Evaluation of the uncooked factor of flavor and odor—(a) Good flavor and odor.* "Good flavor and odor" (a required characteristic of a Grade A product) means that the product has the good flavor and odor of properly prepared breaded shrimp. The flesh portion has either the good flavor and odor of fresh shrimp or at least a bland flavor and odor. The batter and breading have the good flavor and odor obtained when all components have been properly prepared, used, and maintained. The product is free from rancidity, bitterness and staleness, from bacterial spoilage flavors and odors, and from acquired off flavors or off odors of any kind.

(b) *Reasonably good flavor and odor.* "Reasonably good flavor and odor" (minimum requirement for a Grade B product) means that the product may be somewhat lacking in good flavor and odor, but is free from rancidity, from objectionable bacterial spoilage flavors and odors, and from acquired off flavors and off odors of any kind.

§ 52.3608 *Ascertaining the rating for the factors which are scored.* The essential variations within each factor which is scored are so described that the value may be ascertained for each factor and expressed numerically. The numerical range within each factor which is scored is inclusive. (For example 25 to 30 points means 25, 26, 27, 28, 29 or 30 points).

§ 52.3609 *Appearance—(a) General.* The factor of appearance refers to the amount of loose breading and frost in the package, the amount of moisture in the coating, the degree of freedom of the shrimp flesh from discoloration or dehydration, and to the uniformity and desirability of color of the product after cooking.

(b) *(A) classification.* Frozen raw breaded shrimp that possess a good appearance may be given a score of 25 to 30 points. "Good appearance" means that the appearance of the product is characteristic of properly prepared raw breaded shrimp and is of such quality with respect to loose breading or frost; moisture in the coating; discoloration or dehydration of the flesh; and lack of uniformity or desirability of the color of the cooked product that, collectively, the appearance is not more than slightly affected.

(c) *(B) classification.* Frozen raw breaded shrimp that possess a reasonably good appearance may be given a score of 21 to 24 points. "Reasonably good appearance" means that the appearance of the product is characteristic of reasonably well prepared raw breaded shrimp and is of such quality with respect to loose breading or frost; moisture in the coating; discoloration or dehydration of the flesh; and lack of uniformity or desirability of the color of the cooked product that, collectively, the appearance is not more than moderately affected.

(d) *(SSD.) classification.* Frozen raw breaded shrimp which fail to meet the requirements of paragraph (c) of this section may be given a score of 0 to 20 points and shall not be graded above U. S. Grade B, regardless of the total score for the product (this is a partial limiting rule).

(e) *Schedule of point deductions.* For the purpose of rating the factor of appearance the following schedule of point deductions in Table I applies:

TABLE I—SCHEDULE OF POINT DEDUCTIONS

Factor	Deductions
Loose breading or frost:	
Less than 2 percent by weight of product.....	0
Less than 3 percent by weight of product.....	3
Less than 6 percent by weight of product.....	6
6 percent or more by weight of product.....	10
Excess moisture in coating: Degree of halo or ballooning:	
None obvious.....	0
Very slight.....	1
Slight.....	2
Moderate.....	3
Marked.....	4
Excessive.....	5
Discoloration and dehydration:	
None obvious.....	0
Slight but obvious, on average.....	3
Moderate, on average.....	6
Excessive—per unit.....	3
Uniformity of color (after cooking):	
Uniform; desirable color.....	0
20 percent lack uniform desirable color.....	2
Each additional 20 percent.....	3

§ 52.3610 *Defects—(a) General.* The factor of defects refers to the degree of freedom of the product from such defects as broken or damaged frozen raw breaded shrimp, fragmented shrimp,

black spots, sand veins, and from extraneous shrimp material.

(1) *Broken or damaged frozen raw breaded shrimp.* "Broken frozen raw breaded shrimp" means a frozen raw breaded shrimp which has been separated into two or more parts or that has been crushed or otherwise mutilated to the extent that its appearance is materially affected.

(2) *Fragmented shrimp.* "Fragmented shrimp" means a breaded unit containing less than one headed, peeled, deveined shrimp.

(3) *Black spot.* "Black spot" means any blackened area which is markedly apparent on the flesh of the shrimp.

(4) *Sand vein.* "Sand vein" means any sand vein or portion thereof that has not been removed, except for that portion under the shell segment adjacent to the tail fin when present.

(5) *Extraneous shrimp material.* "Extraneous shrimp material" means heads, swimmerets, walking legs, and antennae, whether loose or attached to the shrimp or other material normally removed in the cleaning process except that Fantail Shrimp or Round Fantail Shrimp may have a properly attached tail fin (and in Subtype A, one adjoining segment of shell).

(b) *(A) classification.* Frozen raw breaded shrimp that are practically free from defects may be given a score of 34 to 40 points. "Practically free from defects" means that the product is of such quality with respect to freedom from broken or damaged frozen raw breaded shrimp; fragmented shrimp; black spot; sand veins; extraneous shrimp material; and other similar defects that, collectively, the quality is not more than slightly affected.

(c) *(B) classification.* Frozen raw breaded shrimp that are reasonably free from defects may be given a score of 28 to 33 points. Frozen raw breaded shrimp that fail in this classification may not be graded above U. S. Grade B, regardless of the total score for the product (this is a limiting rule). "Reasonably free from defects" means that the product is of such quality with respect to freedom from broken or damaged frozen raw breaded shrimp; fragmented shrimp; black spot; sand veins; extraneous shrimp material; and other similar defects that, collectively, the quality is not more than moderately affected.

(d) *(SSD.) classification.* Frozen raw breaded shrimp that fail to meet the requirements of paragraph (c) of this section may be given a score of 0 to 27 points and may not be graded higher than Substandard, regardless of the total score for the product (this is a limiting rule).

(e) *Schedule of point deductions.* For the purpose of rating the factor of defects, the following schedule of point deductions in Table II applies:

TABLE II—SCHEDULE OF POINT DEDUCTIONS

Factor	Deductions
Broken or damaged shrimp:	
None.....	0
5 percent of units.....	2
10 percent of units.....	6
Each additional 5 percent of units.....	3
Tail fin broken or missing, per unit.....	1
Limit 5 percent A; 10 percent B.	
Fragmented shrimp, less than 4 complete segments:	
None.....	0

For each 5 percent.....	3
Limit 5 percent A; 10 percent B.	
Black spot, extending to ventral line:	
None.....	0
For each 5 percent.....	3
Limit 5 percent A; 20 percent B.	
Sand veins:	
None.....	0
For each 5 percent.....	3
Limit 5 percent A; 20 percent B.	
Extraneous shrimp material:	
None.....	0
For each 5 percent.....	3
Limit 5 percent A; 10 percent B.	

§ 52.3611 Character—(a) General. The factor of character refers to the degree of uniformity of size of the frozen raw breaded shrimp, the ease of separation of the frozen units without damage to coating or breakage of shrimp, the adherence and continuity of the coating of the cooked product, and the texture of the flesh and of the coating of the cooked shrimp.

(b) (A) *classification.* Frozen raw breaded shrimp that possess a good character may be given a score of 26 to 30 points. "Good character" means that the product is characteristic of properly prepared raw breaded shrimp and is of such quality with respect to the degree of uniformity of size; the ease of separation of the units; the adherence and continuity of the coating; and the texture of the flesh and of the coating that, collectively, the character is not more than slightly affected.

(c) (B) *classification.* Frozen raw breaded shrimp that possess a reasonably good character may be given a score of 21 to 25 points. "Reasonably good character" means that the character of the product is characteristic of reasonably well prepared raw breaded shrimp and is of such quality with respect to the degree of uniformity of size; the ease of separation of the units; the adherence and continuity of coating; and the texture of the flesh and of the coating that, collectively, the character is not more than moderately affected.

(d) (SSId.) *classification.* Frozen raw breaded shrimp that fail to meet the requirements of paragraph (c) of this section may be given a score of 0 to 20 points and shall not be graded above U. S. Grade B regardless of the total score for the product (this is a partial limiting rule).

(e) *Schedule of point deductions.* For the purpose of rating the factor of character, the following schedule of point deductions in Table III applies:

TABLE III—SCHEDULE OF POINT DEDUCTIONS

Factor	Deductions
Uniformity of size (frozen units) (ratio of weight of 2 largest to 2 smallest shrimp in sample unit):	
1.70.....	0
1.80.....	1
1.90.....	2
2.00.....	3
2.10.....	4
2.20.....	5
2.30.....	6
2.40.....	7
2.50.....	8
2.60.....	9
Over 2.60.....	10
Ease of separation (frozen units):	
Easy—No or slight damage to coating.....	0
Moderate—Damage to coating.....	2
Difficult—Requires a knife.....	5
Difficult—Breakage 1 or 2 units.....	5
Difficult—Breakage more than 2 units.....	8

Adherence (cooked product):	
No obvious damage.....	0
Up to 20 percent blistered or cracked coating.....	2
Over 20 percent blistered or cracked coating.....	5
Texture of flesh (cooked product):	
Firm, yet tender and moist.....	0
Moderately dry, tough, stringy or mushy:	
20 percent of units.....	5
Each additional 20 percent of units.....	1
Markedly dry, tough, stringy or mushy:	
20 percent of units.....	10
Each additional 20 percent of units.....	3
Texture of coating (cooked product):	
Good crisp tender texture.....	0
Moderately dry, tough, mushy or with some hard lumps:	
20 percent of units.....	3
Each additional 20 percent of units.....	1
Markedly dry, tough, mushy or with many hard lumps:	
20 percent of units.....	5
Each additional 20 percent of units.....	2

DEFINITIONS AND METHODS OF ANALYSIS

§ 52.3612 Definitions and tentative method of analysis—(a) Percent of breeding. "Percent of breeding" means the percent of weight of batter and breeding in a sample as determined by the following method:

- (i) *Equipment needed.* (1) Two-gallon butter churn equipped with a 4-vaned wooden paddle;
- (ii) Stirring device capable of rotating the wooden paddle at 120 rpm;
- (iii) Balance accurate to 0.01 ounce (or 0.1 gram);
- (iv) U. S. standard sieve—ASTM—No. 20, 12-inch diameter;
- (v) U. S. standard sieve—½ inch sieve opening, 12-inch diameter;
- (vi) Spatula, 4-inch blade;
- (vii) Forceps, blunt points;
- (viii) Shallow baking pan.

(2) *Procedure.* (i) Weight sample to be debreaded. Fill churn ¾ full of water at 70–80 degrees Fahrenheit, lower churn in place and adjust speed to 120 rpm. Add shrimp and stir for 10 minutes. Stack the sieves, the ½ inch mesh over the No. 20, and pour contents of churn onto them. Set the sieves under a faucet, preferably with spray attached and rinse shrimp with no rubbing of flesh, being careful to keep all rinsings over the sieves and not having the stream of water hit the shrimp on the sieve directly. Lay the shrimp out singly on the sieve as rinsed, remove top sieve and drain on a slope for two minutes, then remove shrimp to weighing pan. Rinse contents of the No. 20 sieve onto a flat pan and collect any particles other than breeding (flesh, tail fin or extraneous material) and add to shrimp on balance pan and weigh.

(ii) Calculate percent breeding removed:

$$\frac{\text{Weight of sample} - \text{weight of debreaded sample}}{\text{Weight of sample}} \times 100 = \text{percent breeding}$$

(b) *Cooked in a suitable manner.* "Cooked in a suitable manner" means cooked in accordance with the instructions accompanying the product. However, if specific instructions are lacking, the product for inspection is cooked as follows:

(1) Place the sample to be cooked while still frozen in a wire mesh deep fry basket sufficiently large to hold the shrimp in a single layer without touching each other;

(2) Lower the basket into suitable liquid oil or hydrogenated vegetable oil at 350°–375° F. Fry for three minutes, or until the shrimp attain a pleasing golden brown color; and

(3) Remove basket from oil and allow to drain for 15 seconds. Place the cooked shrimp on a paper napkin or towel to absorb excess oil.

LOT CERTIFICATION TOLERANCES

§ 52.3613 Tolerances for certification of officially drawn samples. (a) The grade of a specific lot from which samples have been officially drawn may be certified on the basis of such samples: *Provided*, That all packages meet applicable provisions of the Federal Food, Drug, and Cosmetic Act in effect at the time of the aforesaid certification. *And provided further*, That, with respect to those factors which are rated by score points, such grade will be determined by averaging the total scores, if:

- (1) Not more than one-sixth of the packages fail to meet the grade indicated by the average of such total scores;
- (2) None of the packages fall more than one grade below the grade indicated by the average of such total scores; and
- (3) The average score of all packages for any factor subject to a limiting rule is within the score range of that factor for the grade indicated by the average of the total scores of the packages comprising the sample.

SCORE SHEET

§ 52.3614 Score sheet for frozen raw breaded shrimp.

Size and kind of container.....	
Container mark or identification.....	
Label.....	
Size of lot.....	
Number of samples.....	
Actual net weight (ounces).....	
Number of shrimp per container.....	
Descriptive size name.....	
Product type.....	
Product style (breeding percentage).....	
Loose breeding percentage.....	
Ratio weights: 2-largest/2-smallest.....	
Factors	Score points
Appearance.....	30 (A) 25-30 (B) 21-24 (SSId.) 0-20
Defects.....	40 (A) 34-40 (B) 28-33 (SSId.) 0-27
Character.....	30 (A) 25-30 (B) 21-25 (SSId.) 0-20
Total score.....	100

Grade for scored factors.....
Final grade.....

¹ Indicates partial limiting rule.
² Indicates limiting rule.

Dated: May 14, 1957.

[SEAL] ROY W. LENNARTSON,
Deputy Administrator,
Marketing Services.



Federal Trade Commission

TWO CANNERS CHARGED WITH ILLEGAL BROKERAGE PAYMENTS:

Two Eastport, Me., processors of sardines were charged on April 4 by the Federal Trade Commission with making



illegal brokerage payments to some of their customers.

According to the complaint, the respondents customarily sell canned sardines through brokers who receive commissions of up to 5 percent of the market price. However, the complaint charges, some sales are made by respondents directly to purchasers at prices as much as 5 percent below the market price.

The result of these latter transactions, the complaint alleges, is that the respondents are giving direct buyers discounts in lieu of brokerage in violation of the law. Sec. 2(c) of the Robinson-Patman Amendment to the Clayton Act prohibits sellers from giving brokerage or other compensation to customers buying for their own account.

The complaint notes that the respondents' products are packaged in cans with and without keys. Brokers, the complaint says, receive a 3-percent fee on sales of keyless cans and 5 percent on sales of cans with keys.

Since early 1954, the complaint continues, brokers have been permitted to make sales to purchasers at 5 percent below market price. When the broker makes such a sale, however, the respondents pay him fees of less than 3 or 5 percent. (On these sales he is usually paid 10 cents per case of sardines.) The result of this transaction, the complaint charges, is that the buyer purchasing through the broker at 5 percent off is receiving part of the commission to which the broker is ordinarily entitled. This practice also violates the law, the complaint says.

The parties are granted 30 days in which to file answer to the complaint. A hearing is scheduled June 12 in East-

port, Me., before a Commission hearing examiner.

Another Maine cannery was charged on February 12 by the Commission with making illegal brokerage payments to some of its customers. That company was granted 30 days to file an answer to the complaint. A hearing was scheduled for April 16 in Lubec, Me., before a Commission examiner.



Department of Health, Education, and Welfare

FOOD AND DRUG ADMINISTRATION

EFFECTIVE DATE EXTENDED FOR CANNED TUNA FILL-OF- CONTAINER STANDARD:

An order adopting definition and standard of identity and standards of fill-of-container for canned tuna was published in the Federal Register of February 13, 1957, by the Food and Drug Administration of the U. S. Department of Health, Education, and Welfare. The effective date for the standards of fill of container for canned tuna has been extended to August 13, 1957, according to the May 2 Federal Register. Originally the standard of fill of container was to become effective 90 days after February 13, 1957. The definition and standard of identity promulgated by the same order is still scheduled to become effective on the original date of February 13, 1958.

A request for a 60-day extension of time in which to file objections to the order promulgating a definition and standard of identity and standards of fill of container for canned tuna was granted by an order published in the March 7 Federal Register. The time for filing objections was extended until May 13, 1957.

TITLE 21—FOOD AND DRUGS

Chapter 1—Food and Drug Administration, Department of Health, Education, and Welfare

Subchapter B—Food and Food Products

PART 37—FISH; DEFINITIONS AND STANDARDS OF IDENTITY; STANDARDS OF FILL OF CONTAINER

ORDER EXTENDING EFFECTIVE DATE ON FILL OF CONTAINER STANDARDS FOR CANNED TUNA FISH

In the matter of adopting standards of fill of container for canned tuna fish.

Pursuant to the provisions of the Federal Food, Drug, and Cosmetic Act (secs. 401, 701, 52 Stat. 1046, 1055, as amended; 21 U. S. C. 341, 371), the Commissioner of Food and Drugs, under authority delegated to him by the Secretary of Health, Education, and Welfare (20 F. R. 1996) caused to be published in the *FEDERAL*

REGISTER of February 13, 1957 (22 F. R. 892), an order fixing and establishing a definition and standard of identity and standards of fill of container for canned tuna fish. A period of 30 days was permitted for the filing of objections to the order, in accordance with the provisions of the statute (supra), and an order granting an extension of time for the filing of objections was subsequently published (22 F. R. 1429).

A request having been received for an extension of the effective date for the

standards of fill of container for canned tuna fish, in order to permit more effective compliance with these standards, and such request appearing to be based on reasonable grounds: *It is ordered*, That the effective date for the standards of fill of container for canned tuna fish be extended to August 13, 1957.

(Sec. 701, 52 Stat. 1055, as amended; 21 U. S. C. 371)

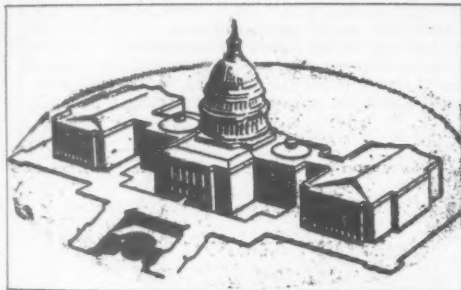
Dated: April 25, 1957.

[SEAL] GEO. P. LARRICK,
Commissioner of Food and Drugs.



Eighty-Fifth Congress (First Session)

Listed below are the public bills and resolutions and reports that directly or indirectly affect the fisheries and allied industries. Public bills and resolutions



are shown when introduced; from month to month the more pertinent reports and hearings, or chamber actions on the bills shown are published; and if passed, the date when signed by the President.

ALASKA STATEHOOD: *H. R. 50* (Bartlett), reported favorably to the House on May 28 by the Committee on Interior and Insular Affairs (amended and a clean bill drafted and introduced), provides for the admission of the State of Alaska to the Union. The bill as approved by the Subcommittee on Territorial and Insular Affairs included an amendment that would defer for five years after Alaskan statehood took effect the transfer of fish and wildlife resources from the Interior Department to Alaskan authorities. This amendment was deleted by the full committee. See *Commercial Fisheries Review*, February 1957, p. 62 and May 1957, p. 71 for other information on this subject.

Amendment to Alaska statehood bill (Westland) would provide supervision for five years by Fish and Wildlife Service; adopted by the subcommittee, but thrown out by the full House Committee on Interior and Insular Affairs. Believes amendment would be necessary to maintain Northwest fishing industry without danger of being frozen out by laws made for and by Alaskans.

CHEMICAL ADDITIVES IN FOOD: *H. R. 7798* (Delaney) introduced in the House on May 28, a bill to protect the public health by amending the Federal Food, Drug, and Cosmetic Act so as to provide for the safety of chemical additives in food. Also: *H. R. 7938* (Mrs. Sullivan) introduced in the House on June 5; both bills referred to the Committee on Interstate and Foreign Commerce. See *Commercial Fisheries Review*, February 1957, p. 63 and May 1957, p. 71 for other bills.

FAIR LABOR STANDARDS ACT INCREASED COVERAGE: *S. 1853* (Kennedy and McNamara) introduced in the Senate on April 9, a bill to amend the Fair Labor Standards Act of 1938, as amended, to provide coverage for employees of enterprises engaged in commerce or in the production of goods and services for commerce or the sale thereof, to eliminate certain exemptions, and for other purposes; the Committee on Labor and Public Welfare. This is a substitute bill for other Senate bills previously introduced. The bill, which would eliminate the overtime exemption for fish cannerys contained in Section 13 (b) (4) of the Fair Labor Standards Act of 1938, was approved by the Subcommittee, without recommendation, on May 7. The full Committee considered bill on May 27-28, but took no action. See *Commercial Fisheries Review*, February 1957, p. 63, March 1957, p. 59, for other bills.

INTERNATIONAL FISHERIES COMMISSIONS: *H. R. 6871*, a bill making appropriations for Departments of State and Justice, the Judiciary, and related agencies for fiscal year 1958. House Conference Report (No. 492, May 28, 1957) appropriated \$1,600,000 for the use of International Fisheries Commissions. This sum is \$54,000 less than the amount proposed by the Senate.

NORTH PACIFIC FISHERIES ACT OF 1954: *S. 2212* (Magnuson) introduced in the Senate June 5, 1957, a bill to amend the North Pacific Fisheries Act of 1954; to the Committee on Interstate and Foreign Commerce. This bill proposes to extend Federal authority to regulate United States fisheries operations on the high seas, south of Dixon entrance in Alaska, to the entrance of the Strait of Juan De Fuca, between the State of Washington and British Columbia, Canada. Provides for the coordination of conservation practices for the States of Washington, Oregon, and California, the United States and Canada. Similar legislation has already been enacted by the Canadian Legislature, and the three Pacific Coast States. Similar in purpose: *H. R. 7954* (Toljelson) introduced in the House on June 6, 1957.

SMALL BUSINESS ACT AMENDMENT: H. R. 7963 (Spence) introduced in the House on June 6, a bill to amend the Small Business Act of 1953, as amended; to the Committee on Banking and Currency. This bill is a substitute to one or more other bills previously introduced and was ordered favorably reported to the House by the Committee on Banking and Currency. The bill provides that Title II of the Act of July 30, 1953 (Public Law 163, 83rd Congress), as amended, is hereby withdrawn as a part of that Act and is made a separate Act to be known as the "Small Business Act." Defines a small business concern as one which is independently owned and operated and which is not dominant in its field of operation, plus other criteria that can be used by the Administrator of the Act to establish a new definition of "Small Business." Also: authorizes appropriations not to exceed \$650 million to be made to a revolving fund in the Treasury. See *Commercial Fisheries Review*, February 1957, pp. 66 and 67; April 1957, p. 66; and May 1957, p. 72; for other bills on this subject.

SOCKEYE SALMON FISHERIES CONVENTION: Protocol between the United States and Canada to the convention for the protection, preservation, and extension of the sockeye salmon fisheries in the Fraser River system. Favorably reported by the Committee on Foreign Relations on May 23 (*Ex. Rept. 2*) and ratified unanimously by the Senate on June 6.

S. 1806 (Magnuson and Jackson), a bill to amend the Sockeye Salmon Act of 1947. Passed the

Senate with amendments on May 22. Provides for the inclusion of pink salmon under the Act. The amendments under this Act will take effect on the date of entry into force of the protocol, signed at Ottawa on December 28, 1956, between the United States and Canada to the convention for the protection, preservation, and extension of the sockeye salmon fisheries of the Fraser River system, signed at Washington on May 26, 1930. Also: **H. R. 6587** (Tollefson) favorably reported to the House Committee on Merchant Marine and Fisheries on June 4 by the Subcommittee on Fisheries and Wildlife Conservation.

UNEMPLOYMENT IN DEPRESSED AREAS: **H. R. 8001** (Reuss) introduced in the House on June 7, a bill to alleviate conditions of excessive unemployment and underemployment in depressed industrial and rural areas; to the Committee on Banking and Currency. **H. R. 8001** is similar in purpose to **H. R. 1087** (Celler) introduced January 3, 1957 (see *Commercial Fisheries Review*, February 1957, p. 66). **H. R. 1087** would be titled the "Area Development Act" and provides that an area is an "industrial development area:" if (1) unemployment of not less than 6 percent of the labor force, adjusted seasonally, exists and has existed during the major portion of each of the preceding two years, or (2) unemployment of not less than 10 percent of the labor force, adjusted seasonally, exists, with no reasonable prospect for improvement in the immediate future, and has existed throughout the preceding six months.



TOASTED TUNA SANDWICH LOAF

The home economists of the U. S. Fish and Wildlife Service have recently developed and tested a new sandwich which they call "Toasted Tuna French Loaf." It is a combination of toasted French bread filled with canned tuna, grated cheese, prepared mustard, and chopped sweet pickles. Here's the recipe for this newest of sandwiches.

TOASTED TUNA FRENCH LOAF

1 CAN (6½ OR 7 OUNCES) TUNA
 ½ CUP BUTTER OR MARGARINE
 1 TEASPOON PREPARED MUSTARD
 1 SMALL LOAF FRENCH BREAD

1 TABLESPOON GRATED ONION
 1 TEASPOON PREPARED MUSTARD
 1 CUP GRATED CHEESE
 2 TABLESPOONS CHOPPED SWEET PICKLE OR SWEET PICKLE RELISH

Drain tuna. Flake. Cream butter and mustard. Cut bread in half lengthwise and remove a small amount of the center. Spread the bread with mustard-butter. Combine remaining ingredients. Fill bread with tuna mixture. Cut loaf into 12 slices and wrap in aluminum foil. Bake in a very hot oven, 450° F., for 30 minutes or until heated through and cheese melts. Serves 6.

FISHERY INDICATORS

CHART 1 - FISHERY LANDINGS for SELECTED STATES

In Millions of Pounds

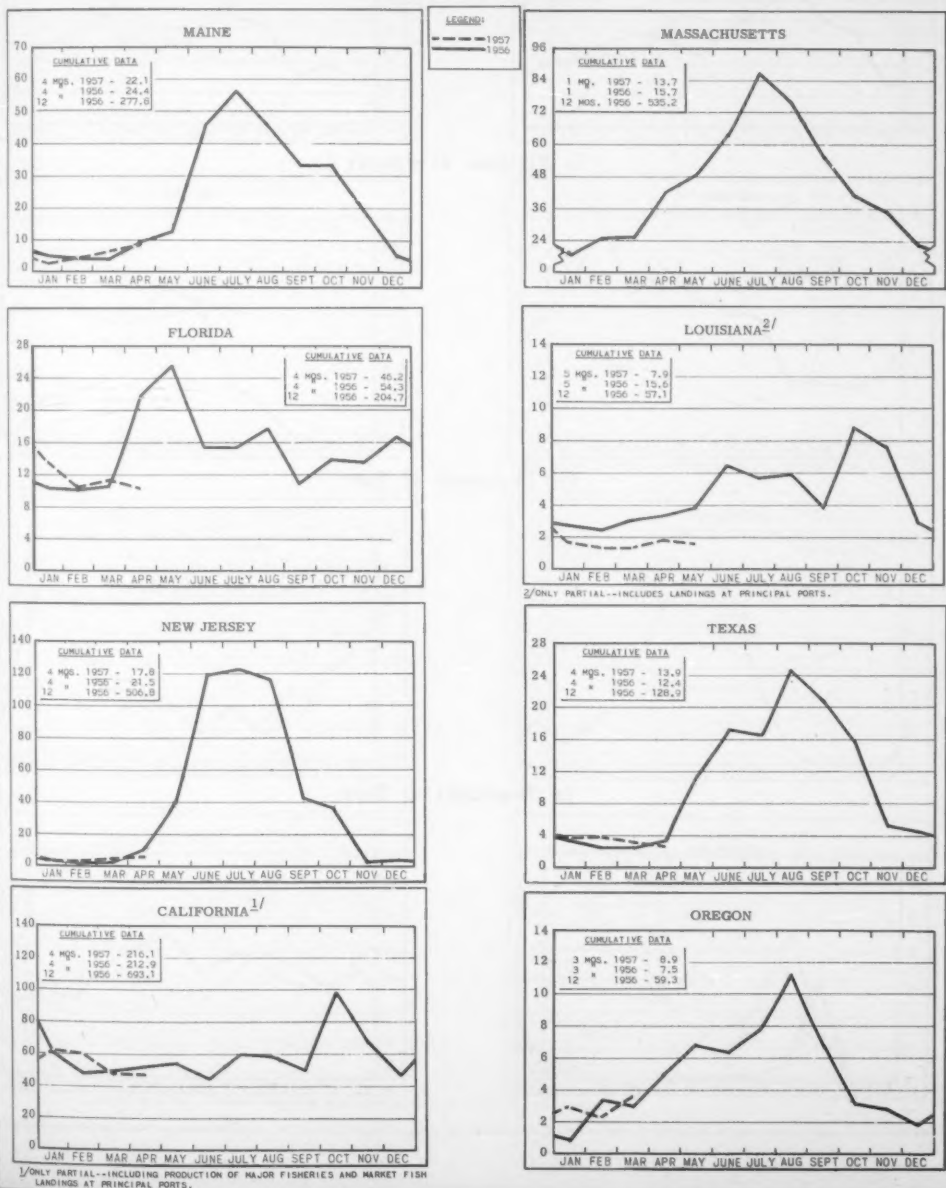
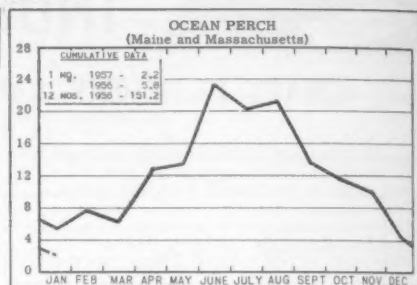
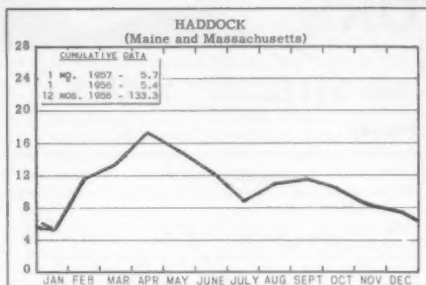
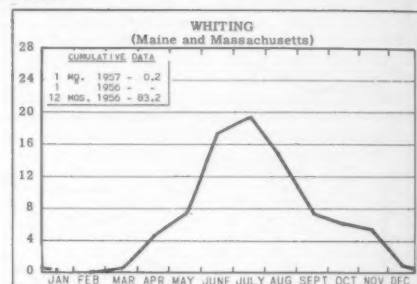
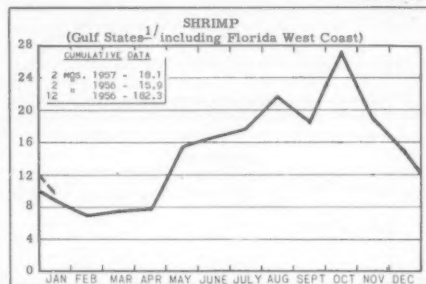


CHART 2 - LANDINGS for SELECTED FISHERIES

In Millions of Pounds

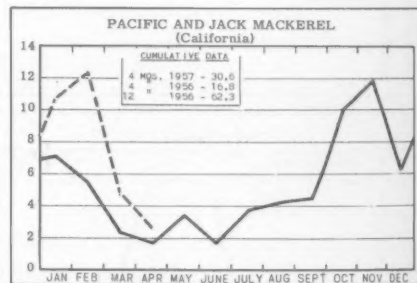
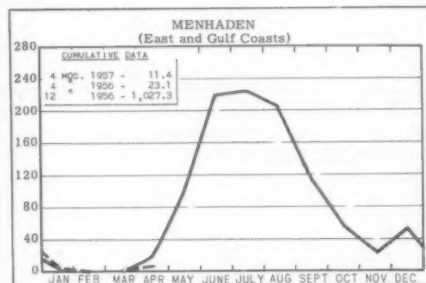


In Millions of Pounds

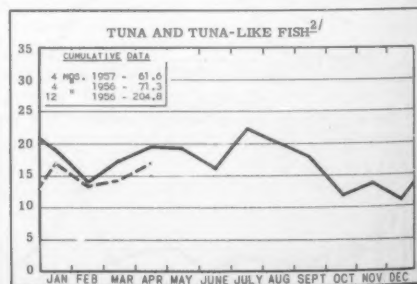
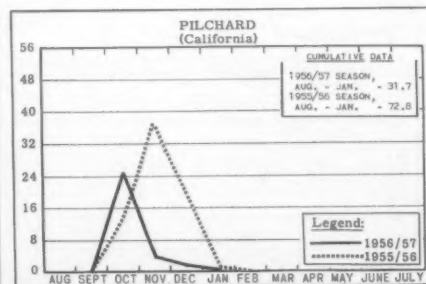


^{1/}LA. & ALA. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.

In Thousands of Tons



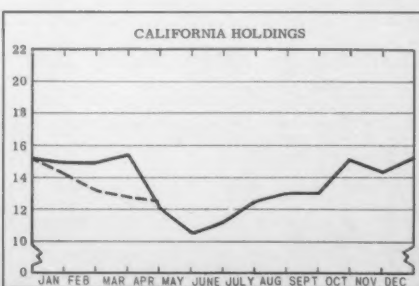
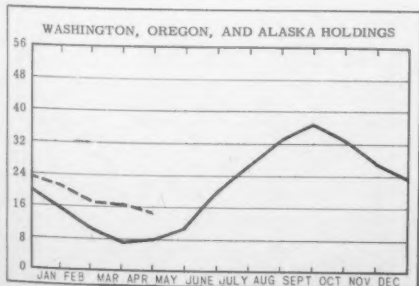
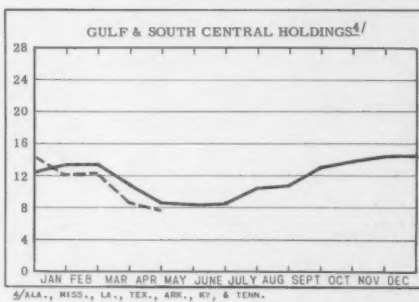
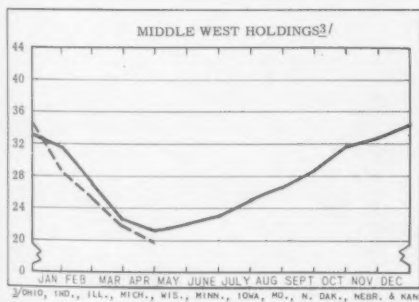
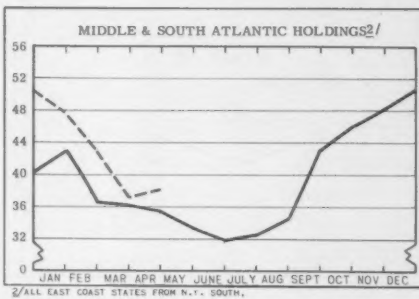
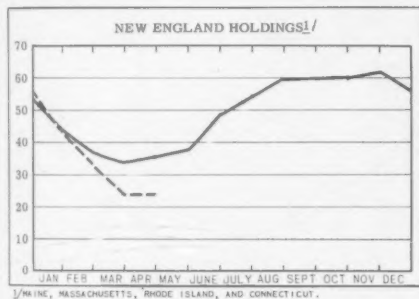
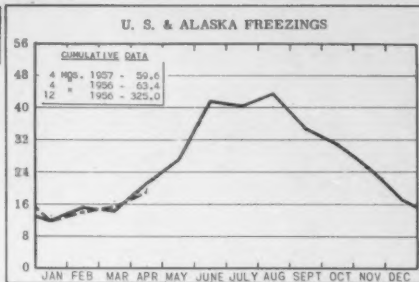
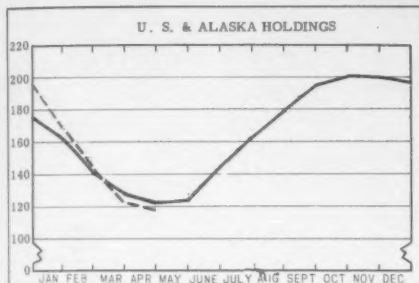
In Thousands of Tons



^{2/}RECEIPTS BY CALIFORNIA CANNERIES, INCLUDING IMPORTS.

CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

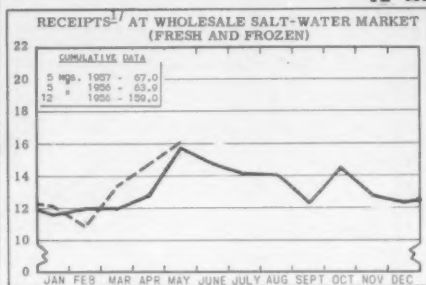
In Millions of Pounds



*Excludes salted, cured, and smoked products.

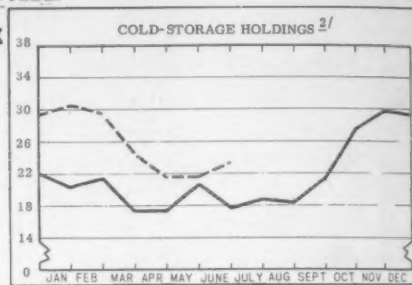
CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pounds

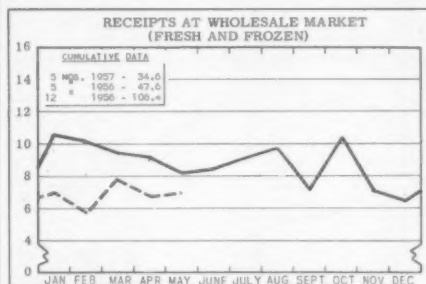


^{1/} INCLUDE TRUCK AND RAIL IMPORTS FROM CANADA AND DIRECT VESSEL LANDINGS AT NEW YORK CITY.

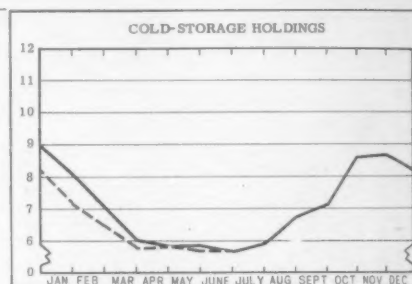
NEW YORK CITY



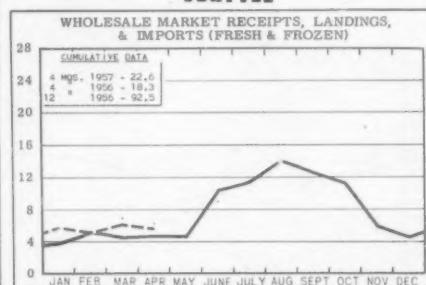
^{2/} AS REPORTED BY PLANTS IN METROPOLITAN AREA.



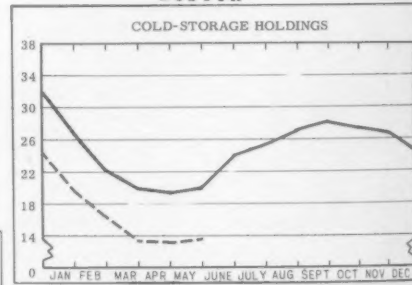
CHICAGO



SEATTLE



BOSTON



LEGEND:
— 1957
--- 1956

CHART 5 - FISH MEAL and OIL PRODUCTION - U.S. and ALASKA

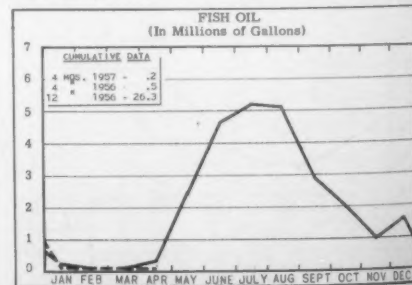
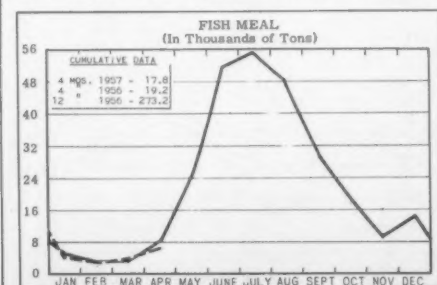
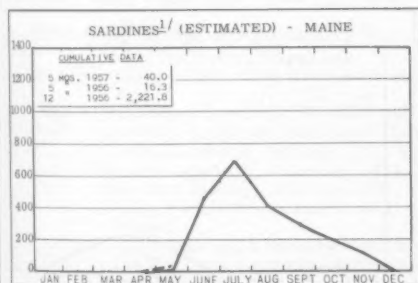
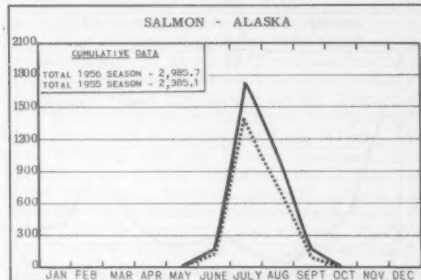
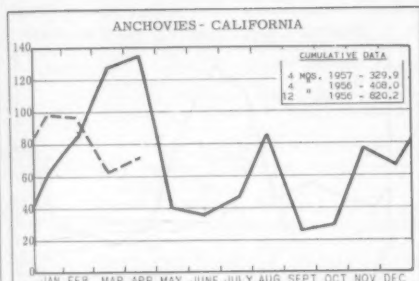
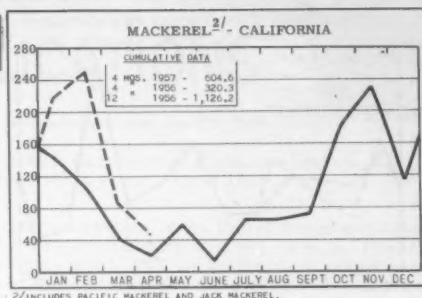
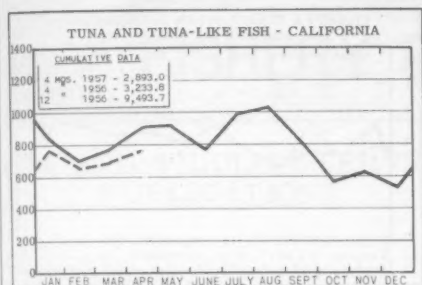


CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

In Thousands of Standard Cases



STANDARD CASES

Variety	No. Cans	Can Designation	Net Wgt.
SARDINES	100	$\frac{1}{4}$ drawn	3 $\frac{1}{4}$ oz.
SHRIMP	48	--	5 oz.
TUNA	48	No. $\frac{1}{2}$ tuna	6 & 7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
SALMON	48	1-pound tall	16 oz.
ANCHOVIES	48	$\frac{1}{2}$ lb.	8 oz.

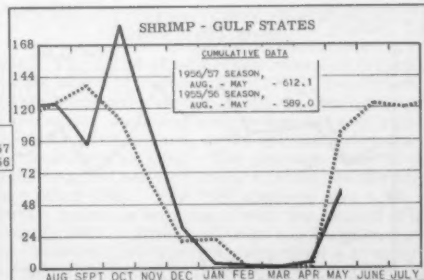
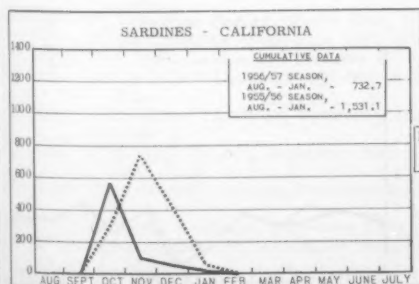
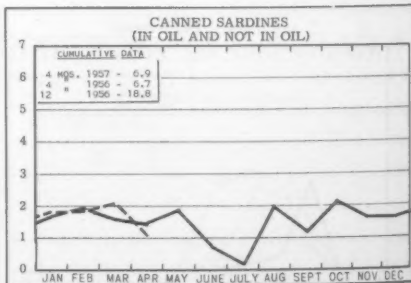
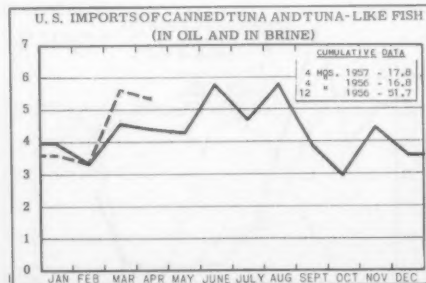
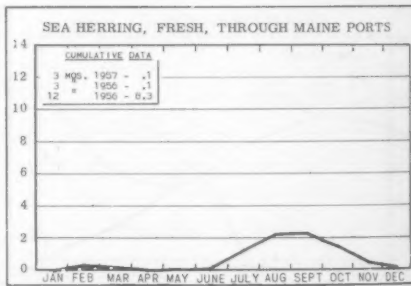
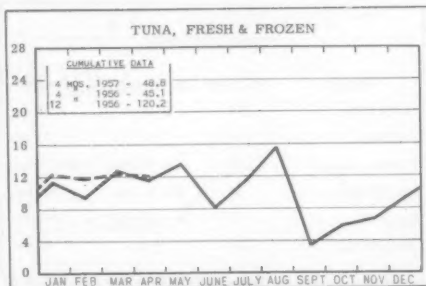
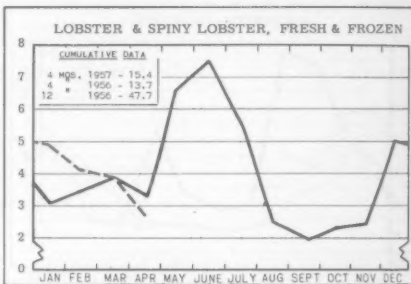
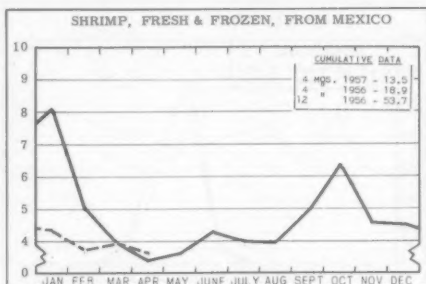
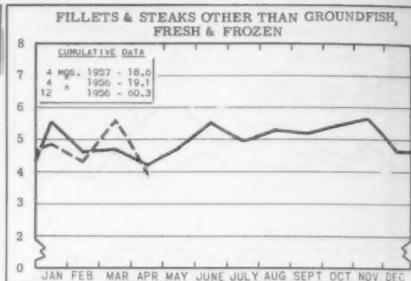
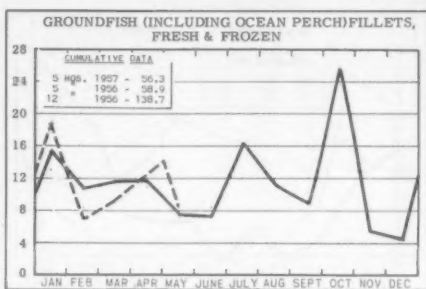
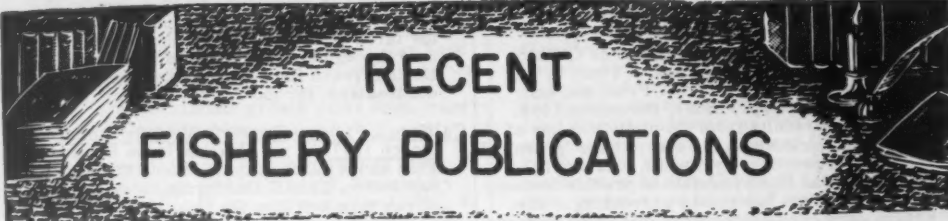


CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds





RECENT FISHERY PUBLICATIONS

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U.S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D.C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

- CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
- SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
- FL - FISHERY LEAFLETS.
- SSR - FISH, - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
- SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS-1499	New Jersey Landings, 1956 Annual Summary, 4 pp.
CFS-1503	Texas Landings, January 1957, 3 pp.
CFS-1505	Massachusetts Landings, August 1956, 4 pp.
CFS-1513	California Landings, November 1956, 4 pp.
CFS-1514	New York Landings, January 1957, 4 pp.
CFS-1515	Lake Fisheries, 1955 Annual Summary, 11 pp.
CFS-1517	Canned Fish and Byproducts, 1956 Annual Summary, 20 pp.
CFS-1518	Packaged Fish, 1956 Annual Summary, 4 pp.
CFS-1519	Mississippi Landings, January 1957, 2 pp.
CFS-1520	California Landings, December 1956, 4 pp.
CFS-1521	Florida Landings, January 1957, 6 pp.
CFS-1522	Georgia Landings, February 1957, 2 pp.
CFS-1523	Alabama Landings, January 1957, 2 pp.
CFS-1524	Frozen Fish, 1956 Annual Summary, 13 pp.
CFS-1525	Texas Landings, February 1957, 2 pp.
CFS-1526	North Carolina Landings, February 1957, 2 pp.
CFS-1527	South Carolina Landings, February 1957, 2 pp.
CFS-1528	Frozen Fish Report, March 1957, 7 pp.
CFS-1529	Maine Landings, February 1957, 3 pp.
CFS-1530	New York Landings, February 1957, 4 pp.
CFS-1531	Rhode Island Landings, February 1957, 3 pp.
CFS-1532	New Jersey Landings, February 1957, 4 pp.
CFS-1533	Fish Stick Report, January - March, 1957, 2 pp.
CFS-1534	Mississippi Landings, February 1957, 2 pp.
CFS-1536	Alabama Landings, February 1957, 2 pp.
CFS-1546	Shrimp Landings, December 1956, 4 pp.
SL-25	Wisconsin 1957 (Lakes Area), Wholesale Dealers in Fishery Products (Revised), 2 pp.

FL-336ff - Commercial Fisheries Outlook, April - June 1957, 43 pp., April 1957.

FL-393 - Fisheries of the United States and Alaska, 1956 (A Preliminary Review), by E.A. Power, 42 pp., April 1957. A preliminary review of commercial fishery activities in 1956. A record 5.2 billion pounds of fish and shellfish was taken by United States and Alaskan fishermen in 1956--a gain of 8 percent as compared with the previous year. It is estimated that the 1956 catch had an ex-vessel value of about \$363 million--about 27 million dollars more than the previous year. The record 1956 catch resulted from the largest menhaden production in the history of the fishery, and sharp increases in catches of tuna, Alaska and Maine herring, jack and Pacific mackerel, and industrial fish in New England. Small gains occurred in salmon, haddock, Pacific halibut, and anchovies while smaller catches were made of shrimp, Pacific sardines, and whiting. In 1956, about 150,000 commercial fishermen utilized 90,000 boats to fish. This leaflet points out that the commercial fishing industry was responsible for the employment of an estimated 300,000 workers in allied industries such as gear manufacture, making processing machinery, and boat construction; the employment of 101,000 shore workers in 4,024 shore establishments including processing plants and some wholesale units but not retailers; and the employment of 3,300 workers using 1,350 boats to transport fish from area of capture to handling and processing plants. The consuming public's response to this activity was to eat an average of 10.1 pounds (edible weight) of fish per person during the year; of this 5.7 pounds were fresh and frozen fish, 3.8 pounds were the canned product, and 0.6 pound was cured. In 1955 the consumption was 10.2 pounds per capita. While the total 1956 catch set an all-time record, the record-shattering portion of it was in industrial fish, with menhaden production setting the pace. The industrial catch, which is largely converted into oil and meal, totaled 2.4 billion pounds, 300 million pounds above the previous record set in 1955. The catch of edible fish was 2.8 billion pounds which is considerably below the record 3.4 billion pounds harvested in 1950. The total value of the catch, including both industrial and food fish, was \$363 million, or \$4 million below the high mark set in 1948. The average price of the catch dropped below 7 cents a pound for the first time since 1945. The 1956 average was 6.98 cents a pound as compared with the record of 8.17 cents in 1951. This decline is due largely to the big industrial catch which comprised a greater portion of the catch than ever before. This leaflet also contains information on the canned pack for 1956 and data by states on the quantity and value

of the 1955 catch and considerable data on imports and exports and world fisheries.

SSR-Fish. No. 197 - Nature of Green or Offcolor Condition in Precooked Yellowfin Tuna, by John J. Naughton, Michael M. Frodyma, and Harry Zeitlin, 12 pp., illus., December 1956. Preliminary results from the analytical use of spectral reflectance in the study of the "greening" condition in precooked yellowfin tuna are reported. It was found possible to predict tendency to greening from laboratory precooking. The preliminary conclusions were that color changes in tuna are the results of oxidative changes in the hemoglobin and myoglobin pigments of the meat, and that differences in color, including greening, result from differences in the concentration of these pigment derivatives. A relatively higher concentration of methemoglobin or metmyoglobin in raw fish meat seems to be indicative of a tendency to greening on precooking.

Sep. No. 476 - A Picture Study of an American Whaling Operation.

Sep. No. 477 - Bulk Handling of Alaska Herring Meal.

Sep. No. 478 - Research in Service Laboratories (May 1957): Contains these articles-- "Technical Note No. 37 - Use of Bacterial Culture to Aid Separation of Menhaden Oil in Gravity Tanks," "Progress on Fish Meal Nutritive Value Studies," and "Iron Sulfide Discoloration of Tuna Cans."

THE FOLLOWING SERVICE PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

Receipts and Prices of Fresh and Frozen Fishery Products at Chicago, 1956, by G. A. Albano, 54 pp., processed, April 1957. (Available free from the Market News Service, U. S. Fish and Wildlife Service, 565 West Washington St., Chicago 6, Ill.) This report presents an analysis of the marketing trends for fresh and frozen fishery products and statistical tables on the receipts of fresh and frozen fish and shellfish at Chicago during 1956. Statistics on arrivals of fishery products at Chicago are presented by species and by states and provinces of origin; states and provinces by species; species by months; states and provinces by months; totals by species; and totals by states and provinces. Receipts are tabulated by methods of transportation (truck, express, and freight). A table shows the monthly range of wholesale prices of some of the leading varieties of fresh and frozen fishery products handled on the Chicago market. In the analysis of the marketing trends for fresh and frozen fishery products at Chicago, the author discusses the sources of the receipts, methods of transportation, months of greatest receipts, receipts by species and varieties, lake trout and whitefish receipts, U.S. imports of fresh and frozen fish from Canada, U.S. imports of frozen fillets, and cold storage inventories. Also included is a table giving the names, classifications, and approximate weights of certain fishery products sold in the Chicago wholesale market.

Boston Fishery Products Monthly Summary, February 1957, 15 pp.; Boston Fishery Products Monthly Summary, March 1957, 15 pp.; Boston Fishery Products Monthly Summary, April 1957, 15 pp. (Market News Service, U.S. Fish and Wildlife

Service, 10 Commonwealth Pier, Boston 10, Mass.) Landings and ex-vessel prices by species for fares landed at the Boston Fish Pier and sold through the New England Fish Exchange; and Boston frozen fishery products prices to primary wholesalers; for the months indicated.

California Fishery Products Monthly Summary, March 1957, 10 pp. (Market News Service, U.S. Fish and Wildlife Service, Post Office Bldg., San Pedro, Calif.) California cannery receipts of raw tuna and tunalike fish, herring, mackerel, anchovies, and squid; pack of canned tuna, herring, mackerel, anchovies, and squid; market fish receipts at San Pedro, Santa Monica, San Diego, and Eureka areas; California imports; canned fish and frozen fish prices; for the month indicated.

(Chicago) January 1957 Monthly Summary of Chicago's Fresh and Frozen Fishery Products Receipts and Wholesale Market Prices, 10 pp.; February 1957 Monthly Summary of Chicago's Fresh and Frozen Fishery Products Receipts and Wholesale Market Prices, 10 pp.; March 1957 Monthly Summary of Chicago's Fresh and Frozen Fishery Products Receipts and Wholesale Market Prices, 10 pp. (Market News Service, U.S. Fish and Wildlife Service, 565 W. Washington St., Chicago 6, Ill.) Receipts at Chicago by species and by states and provinces; fresh-water fish, shrimp, and frozen fillet wholesale market prices; for the months indicated.

Gulf Monthly Landings, Production, and Shipments of Fishery Products, April 1957, 5 pp. (Market News Service, U.S. Fish and Wildlife Service, 609-611 Federal Bldg., New Orleans 12, La.) Gulf States shrimp, oyster, finfish, and blue crab landings; crab meat production; LCL express shipments from New Orleans; and wholesale prices of fish and shellfish on the New Orleans French Market; for the month indicated.

(New York) Monthly Summary - January 1957 - Receipts of Fishery Products at the New York City Wholesale Salt-Water Market, 4 pp. (Market News Service, U.S. Fish and Wildlife Service, 155 John St., New York 38, N.Y.) Receipts in the salt-water section of the Fulton Fish Market by species and by states and provinces for the months indicated.

(Seattle) Monthly Summary - Fishery Products, March 1957, 6 pp. (Market News Service, U.S. Fish and Wildlife Service, 421 Bell St. Terminal, Seattle 1, Wash.) Includes landings and local receipts, with ex-vessel and wholesale prices in some instances, as reported by Seattle and Astoria (Oregon) wholesale dealers; also Northwest Pacific halibut landings; for the month indicated.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D.C.

Effects of Environment and Heredity on Growth of the Soft Clam (MYA ARENARIA), by Harlan S. Spear and John B. Glude, Fishery Bulletin 114 (From Fishery Bulletin of the Fish and Wildlife Service, vol. 57), 17 pp., illus., printed, 20 cents, 1957. The objective of the experiment, described in this report, was to determine whether differences in growth rates of soft clams in two parts

of one bay were caused by environment or by heredity. The experiments demonstrated that environment, not heredity, is the important factor in growth. Clams from one origin may have highly significant differences in growth rate when planted in different areas. Clams of different origins assume similar growth rates when transplanted to the same area.

Laws and Regulations for Protection of the Commercial Fisheries of Alaska, 1957, Regulatory Announcement 51, 82 pp., printed, April 1957, 30 cents. This publication is divided into two sections. One section contains laws for the protection of the commercial fisheries of Alaska and related information, including the authority for regulation, rules regarding oyster culture, Bristol Bay residence requirements, regulation of salmon escapement, fishing gear restrictions, exceptions to weekly closed seasons, etc. The second section contains all the regulations for the commercial fisheries of Alaska amended to date and which became effective April 5, 1957. These 1957 regulations supersede the regulations published in Regulatory Announcement 48 which became effective April 21, 1956.

A Method of Estimating Abundance of Groundfish on Georges Bank, by George A. Rounsefell, Fishery Bulletin 113 (From Fishery Bulletin of the Fish and Wildlife Service, vol. 57), 16 pp., illus., printed, 15 cents, 1957.

Yellowfin Tuna Spawning in the Central Equatorial Pacific, by Heeny S.H. Yuen and Fred C. June, Fishery Bulletin 112 (From Fishery Bulletin of the Fish and Wildlife Service, vol. 57), 17 pp., illus., printed, 15 cents, 1957.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

AMBERGRIS:

Ambergris, Its Properties and Identification, Special Service Bulletin no. 2, 1 p., processed. Marine Laboratory, University of Miami, Coral Gables, Fla., revised June 1953.

CALIFORNIA:

"Report on California's Sacramento River Fisheries," article, 32 pp., processed. Department of Fish and Game, 722 Capitol Ave., Sacramento, Calif., March 29, 1957. There are seven parts to this paper: Part I--Problems of the Sacramento River Salmon, Striped Bass, and Shad Fisheries; Part II--Summary of Facts Relating to Sacramento River Migratory Fisheries; Part III--Conclusions; Part IV--Recommendations; Part V--Reasons for Recommendations; Part VI--Salmon Spawning Survey Results; and Part VII--Incidental Losses of Striped Bass in the Sacramento River Gill-Net Fisheries for Shad and Salmon.

CANADA:

Fisheries Statistics of British Columbia, 1956 (Preliminary), 11 pp., illus., processed. Canadian Department of Fisheries, Vancouver, B.C., Canada, April 5, 1957. A summary of fisheries statistics of British Columbia containing graphs and tables covering quantities and value of the most important species of fish for 1956; landed and marketed value of fish and fishery products for 1942-56; landings and manufactured products marketed in British Columbia for 1956; salmon pack; inventory of boats (10 tons and over), 1956; inventory of boats (less than 10 tons), 1956; and quantity and value of gear used in the primary fisheries, 1956.

Fisheries Statistics of Canada, 1954 (New Brunswick), 59 pp., printed in French and English, 50 Canadian cents. Queen's Printer and Controller of Stationery, Ottawa, Canada, 1957. Consists of tables giving the production and value of the principal species of fish and shellfish in New Brunswick in 1951-54; quantity and value of landings by species and fisheries districts, 1953-54; quantity and value of manufactured fishery products by species and fisheries districts, 1953-54; capital equipment in the primary fisheries operations; and the number of persons engaged in the fisheries.

Fisheries Statistics of Canada, 1954 (Ontario, Prairie Provinces and Northwest Territories), 71 pp., printed in French and English, 50 Canadian cents. Dominion Bureau of Statistics, Ottawa, Canada, 1957. Consists of tables giving the quantity and value of the principal species of inland fish landed in Ontario in 1951-54; quantity and value of landings by species and fisheries districts, Ontario, 1953-54; capital equipment in the primary fisheries operations; and the number of persons engaged in the fisheries. Similar data are also given of the Prairie Provinces (Manitoba, Saskatchewan, and Alberta) and the Northwest Territories.

CEYLON:

Food Regulations of Ceylon, World Trade Information Service Part 2, no. 57-35, 4 pp., printed, 10 cents. Bureau of Foreign Commerce, U.S. Department of Commerce, Washington, D.C. (For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D.C.) The Food and Drugs Act, No. 25 of 1948, provides "for the regulation and control of the importation, sale and distribution of food and drugs and for matters connected therewith or incidental thereto," and gives the Government of Ceylon authority to issue regulations for administering and enforcing its provisions. This leaflet gives the sanitary requirements, special regulations, local regulations, and marking and labeling requirements of Ceylon's imported foods.

CROAKER:

Distribution, Growth, and Availability of Juvenile Croaker, MICROPOGON UNDULATUS, in Virginia, by Dexter S. Haven, Contributions from the Virginia Fisheries Laboratory, No. 68, 10 pp., illus., printed. (Reprinted from Ecology, vol. 38, no. 1, January 1957, pp. 88-97.) Virginia Fisheries Laboratory, Gloucester Point, Va.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

EXPORTS:

United States Exports of Domestic and Foreign Merchandise (Commodity by Country of Destination), Calendar Year 1956, Report No. FT 410, processed, Part I, 238 pp., 30 cents; Part II, 413 pp., \$2. Bureau of the Census, U.S. Department of Commerce, Washington, D.C., 1957. (For sale by the Superintendent of Documents, Washington 25, D.C.) The statistics in Part I cover exports of domestic and foreign merchandise (including fishery products and byproducts) under group 00 to group 5 from the United States to foreign countries. Part II covers merchandise under group 6 to 9 (some items of interest to the fishery and allied industries are included).

FLORIDA:

(Florida State Board of Conservation) Twelfth Biennial Report, 1955-56, 77 pp., illus., printed. Florida State Board of Conservation, Tallahassee, Fla., 1957. Describes the activities of the Florida State Board of Conservation during 1955-56, summarizing the goals attained and progress achieved in the betterment of salt-water conservation. Includes chapters on sport fishing, commercial fisheries, commercial fish landings, oyster cultivation and rehabilitation, research, licenses, administration, and trends. The chapter on commercial fisheries discusses the principal problem of the commercial fishing industry; the continued decline in demand for mullet. Several studies were concluded during the two-year period on the economic and marketing aspects, and other investigations, centered on new products that might be developed from mullet, provided technological know-how for producers. The chapter on commercial fisheries also discusses the second major commercial problem confronting the department, the persistent suspicion that the Tortugas shrimp fishery might be overexploited. The Board sponsored studies into possible preliminary measures to protect the shrimp fisheries' future. Following this research a rule was passed setting a minimum size for shrimp and prescribing certain mesh sizes for shrimp trawl nets.

FRANCE:

"Shell Fishing Methods in Brittany," by Dr. A. V. Brandt, article, World Fishing, vol. 6, no. 4, April 1957, pp. 48-49, illus., printed. John Trundell, Ltd., Temple Chambers, Temple Ave., London, E.C. 4, England. A brief article describing the different types of pots and creels used in taking lobsters and crabs along the French coast.

INTERNATIONAL LAW OF THE SEA:

La Utilizacion y Conservacion de las Riquezas del Mar (The Utilization and Conservation of the Resources of the Seas), by F. V. Garcia Amador, 250 pp., printed in Spanish. Editorial Lex, Amargura 259-261, Havana, Cuba, 1956. Discusses the utilization and conservation of the resources of the seas as one of the most pressing problems of contemporary international law. According to the author, abuse of the freedom of exploitation of the seas makes it necessary to formulate limitations on exploitation through close international cooperation. This book contains the five following chapters: (1) Introduction: Freedom of the Seas and Contemporary Problems;

(2) The Legal Control of the Seas and New Projections of State Authority; (3) Submarine Areas and the Right to Utilize Their Resources; (4) Conservation of the Living Resources of the Seas; and (5) Conclusion: The New International Law of the Sea.

JELLYFISH:

Some Inhabitants of Chesapeake Bay, Animals of Jelly, by Robert Bailey, Contributions from the Virginia Fisheries Laboratory, No. 66, 2 pp., illus., printed. (Reprinted from Virginia Wildlife, vol. XVII, no. 9, September 1956, pp. 12-13.) Virginia Fisheries Laboratory, Gloucester Point, Va.

LAWS AND REGULATIONS:

Conference on Co-ordination of Fisheries Regulations between Canada and the United States (Summary of Proceedings, Seattle, Washington--February 27-28, 1957), 15 pp., processed. U.S. Department of State, Washington 25, D.C. Discusses a meeting of representatives of Canada and the United States to discuss coordination of specific fisheries regulations for the Pacific area pertaining to offshore salmon net fishing, salmon troll fishing, and trawl fishing for petrale sole and black cod. The representatives of both Canada and the United States agreed that development of major offshore salmon net fisheries posed a serious problem and that regulations of such fishing in the eastern Pacific ocean was essential to the conservation of salmon stocks of North American origin. The United States Delegation stated that different regulations with regard to open season and size limit applied to the troll fisheries off the coast of continental United States, Canada, and Alaska and that in their view, such regulations were necessary to conserve the salmon stocks and thus it would be desirable to have these conform in the respective areas. The United States Delegation outlined certain recent developments in the troll and trawl fisheries which demonstrated in their view the necessity for further restrictions particularly with respect to the fishing season for petrale sole, a minimum size limit for black cod, and the mesh size authorized for trawlnets. The major agreements which were reached between the Canadian and United States Delegations during the Conference are presented, as well as a list of those attending the Conference. Reports of the various subcommittees on troll and trawl regulations and the location of the line delimiting offshore waters at the entrance to the Strait of San Juan de Fuca are also included.

Oregon Commercial Fisheries Code, 1955-1956, 158 pp., printed. Oregon Fish Commission, 307 State Office Bldg., Portland 1, Ore. A compilation of the laws of the State of Oregon relating to the protection and propagation of food fish and shellfish.

(Washington) Commercial Fishing Regulations, 1956 (Salmon and Bottomfish), 30 pp., printed. Department of Fisheries, Olympia, Wash., May 1956. This summary is condensed from regulations for the taking of food fish and shellfish for commercial purposes. Contains fishing gear definitions and general definitions and regulations.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

The sections on Puget Sound salmon, Columbia River salmon, Grays Harbor, Willapa Harbor, Pacific Ocean waters, and coastal waters summarize regulations pertaining to areas, gear, and seasons.

MOLLUSKS:

Notes on Fungus Parasites of Bivalve Mollusks in Chesapeake Bay, by Jay D. Andrews, Contributions from the Virginia Fisheries Laboratory, No. 54, 7 pp., processed. (Reprinted from Proceedings of the National Shellfish Association, vol. 45, 1954, pp. 157-163.) Virginia Fisheries Laboratory, Gloucester Point, Va.

MULLET:

Interim Report on Mullet Research, by G.C. Broadhead and H.P. Mefford, Special Service Bulletin no. 8, 9 pp., processed. Marine Laboratory, University of Miami, Coral Gables, Fla., January 1954.

NAVIGATION:

Annual Report of the Director of the Coast and Geodetic Survey for the Fiscal Year Ended June 30, 1956, 75 pp., illus., printed, 40 cents. Coast and Geodetic Survey, U.S. Department of Commerce, Washington, D.C. Describes the activities and functions of the Coast and Geodetic Survey for 1956, including the preparation and issuance of nautical charts and coast pilots.

List of Lights and Other Marine Aids, Great Lakes, United States and Canada, Ninth Coast Guard District, Corrected to March 1, 1957, 235 pp., illus., processed, \$1.75. U.S. Coast Guard, Washington, D.C. (For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D.C.) Lights and other marine aids to navigation maintained by or under authority of the United States Coast Guard and the Dominion of Canada on the Great Lakes and the St. Lawrence River above St. Regis River are contained in this list. This list is intended to furnish more complete information concerning aids to navigation than can be conveniently shown on charts. It is not intended to be used in navigation in the place of charts and the lake pilot and should not be so used. The charts should be consulted for the location of all aids to navigation.

Supplement to United States Coast Pilot 1, Atlantic Coast, Section A, St. Croix River to Cape Cod, Fifth (July 1, 1950) Edition, Serial 737/7, 39 pp., printed, February 2, 1957; Supplement to United States Coast Pilot 9, Alaska, Cape Spencer to Arctic Ocean, Sixth (November 6, 1954) Edition, Serial 779/2, 22 pp., printed, February 16, 1957; and Supplement to United States Coast Pilot 10, Hawaiian Islands, Third (January 1, 1950) Edition, Serial 735/7, 14 pp., printed, February 16, 1957. Coast and Geodetic Survey, U.S. Department of Commerce, Washington 25, D.C.

OYSTERS:

Changes in the Physiography of Oyster Bars in the James River, Virginia, by Nelson Marshall, Contribution No. 17 of the Oceanographic Institute, Florida State University, 9 pp., illus., printed. (Reprinted from The Virginia Journal of Science,

vol. 5, no. 3, July 1954, pp. 173-181.) The Oceanographic Institute, Florida State University, Tallahassee, Fla.

Cultivation of Oysters in Ponds at Bears Bluff Laboratories, by G. Robert Lunz, 5 pp., processed. (Reprinted from Proceedings of the National Shellfisheries Association, vol. 46, pp. 83-87.) Bears Bluff Laboratories, Wadmalaw Island, S.C. One of the greatest drawbacks to good quality oyster production is "wrap-up," or the crowding of oysters on cultch. This is due to the long setting season, the intensity of setting, and the low mortality of the young. To control this intense setting, to practice water farming, and to utilize unproductive lands, cultivation of oysters in ponds was begun in 1944. This paper describes the construction of the ponds, the planting of seed oysters, and the results of the experiments.

Osmotic Behavior and Bleeding of the Oyster, CRASSOSTREA VIRGINICA, by Milton Fingerhman and Laurence D. Fairbanks, 19 pp., illus., printed. (Reprinted from Tulane Studies in Zoology, vol. 3, no. 9, April 12, 1956, pp. 151-168.) Department of Zoology, Tulane University, New Orleans, La. The present investigation was undertaken with a twofold purpose. The first aim was to obtain quantitative information concerning the weight changes and fluid losses that occur during the summer months in Southern oysters after the body has been removed from the shell. The second aim was to investigate in a detailed fashion the osmoregulatory ability of the American oyster, Crassostrea virginica. Results of these studies are presented.

Oyster Mortality Studies in Virginia--II. The Fungus Disease Caused by DERMOCYSTIDIUM MARINUM in Oysters of Chesapeake Bay, by Jay D. Andrews and Willis G. Hewatt, Contributions from the Virginia Fisheries Laboratory, No. 69, 25 pp., illus., printed. (Reprinted from Ecological Monographs, vol. 27, no. 1, January 1957, pp. 1-25.) Virginia Fisheries Laboratory, Gloucester Point, Va.

Setting of Oysters in Virginia, by Jay D. Andrews, Contributions from the Virginia Fisheries Laboratory, No. 53, 9 pp., processed. (Reprinted from Proceedings of the National Shellfish Association, vol. 45, 1954, pp. 38-46.) Virginia Fisheries Laboratory, Gloucester Point, Va.

Temperature Control Experiments on the Fungus Disease, DERMOCYSTIDIUM MARINUM, of Oysters, by Willis G. Hewatt and Jay D. Andrews, Contributions from the Virginia Fisheries Laboratory, No. 62, 5 pp., processed. (Reprinted from Proceedings of the National Shellfish Association, vol. 46, pp. 129-133.) Virginia Fisheries Laboratory, Gloucester Point, Va.

What Killed Your Oysters? by Jay D. Andrews, Contributions from the Virginia Fisheries Laboratory, No. 65, 2 pp., illus., printed. (Reprinted from Southern Fisherman, vol. XVI, no. 7, July 1956, pp. 22-23.) Virginia Fisheries Laboratory, Gloucester Point, Va.

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OYSTER DRILLS:

Trapping Oyster Drills in Virginia--I. The Effect of Migration and Other Factors on the Catch, by Jay D. Andrews, Contributions from the Virginia Fisheries Laboratory, No. 63, 15 pp., illus., processed; and II. The Time Factor in Relation to the Catch per Trap, by J. L. McHugh, Contributions from the Virginia Fisheries Laboratory, No. 64, 14 pp., illus., processed. (Reprinted from Proceedings of the National Shellfish Association, vol. 46, pp. 140-168.) Virginia Fisheries Laboratory, Gloucester Point, Va.

PHILIPPINES:

"Commercial Trawling in the Philippines," by Porfirio R. Manacop, article, The Philippine Journal of Fisheries, vol. 3, no. 2, July-December 1955, pp. 117-188, illus., printed. Department of Agriculture and Natural Resources, Manila, Philippines, 1956. Describes the trawl fishery which has developed to some magnitude in the Philippines over the last 30 years. Because of the increasing economic importance of the trawl industry, the author has written a detailed account of the nature and extent of the fishery as a whole and a study of the gear requirements and its operation. In addition to the excellent description and clear illustrations of the different types of trawling gear used in the Philippines, the author discusses the care and handling of the catch aboard the vessel; the species of fish, with their English and scientific names, taken by the commercial otter trawlers; marketing the catch; care and maintenance of fishing gear and accessories; and the outlook of the trawl fishery.

PRESERVATION:

"Aureomycin as an Ice Additive for Fresh Fish," by B. Albertson, article, Industrial Refrigeration, no. 3, September 1956, pp. 19-20, 52, printed. Nickerson and Collins Co., 435 North Waller Ave., Chicago 44, Ill.

"Organoleptic Studies of Irradiated Foods," by G. B. Pratt and O. F. Ecklund, article, Food Technology, October 1956, pp. 496-499, illus., printed. Institute of Food Technologists, 176 West Adams St., Chicago, Ill.

"Radiation Preservation of Foods: The Present Position," by R. S. Hannan, article, Bulletin de l'Institut International du Froid, vol. XXXVII, no. 1, 1957, pp. 179-209, illus., printed in English with a summary in French. Institut International du Froid, 177, Boulevard Maiesherbes, Paris 17^e, France.

RED TIDE:

Irritant Gases Associated with Red Tide, by Robert M. Ingle, Special Service Bulletin no. 9, 4 pp., processed. Marine Laboratory, University of Miami, Coral Gables, Fla., March 1954.

A Tentative Method for the Prediction of the Florida Red Tide Outbreaks, by Frank Chew, Contribution No. 162, 13 pp., illus., printed. (Reprinted from Bulletin of Marine Science of the Gulf and Caribbean, vol. 6, no. 4, pp. 292-304, December 1956.) The Marine Laboratory, University of Miami, Coral Gables, Fla. Terrigenous

nutrient supply in a mass of water of estuarine origin as a significant parameter in red tide outbreak is further studied as part of an investigation for the Florida State Board of Conservation. A relationship between an estuarine mass, carrying the nutrient supply, and the ambient environment is suggested. This relationship is applied to the Florida red tide with the help of a new hypothesis of red tide outbreak.

REFRIGERATION AND FREEZING:

"Changes of Internal Temperature in Carps Subjected to Refrigeration by Means of Fresh-Water Ice" (Comportamento della temperatura in carpe sottoposte a refrigerazione con ghiaccio d'acqua comune), by P. Savi and G. Braccio, article, Il Freddo, vol. 10, no. 4, July-August 1956, pp. 51-54, illus., printed in Italian. Associazione Frigorifica Italiana, Via Donatello 8, Milano, Italy.

"The Cooling of Sea Perch on Board Freezer Ships" (Okhlazdeniye stavridy na refrizeratorakh), by Z.I. Vetrova, G.I. Ciplakova, and P.I. Kijokova, article, Rybnoe Khozjaistvo, no. 4, 1956, pp. 10-11, printed in Russian. Kotel 'nicheskaja Naberezhnaja D 1/15, Souzspechatel Otdel "Zhurnal-Pochtoi," Moscow, Zh-240, U.S.S.R.

"Fish Fillets and Fish Sticks," article, Quick Freezing, October 1956, pp. 280-282, illus., printed. Refrigeration House, Victoria Road, Woking, Surrey, England. Describes a new freezing line for consumer packs at Hull, Great Britain. After being filleted, graded, and weighed, then packaged, the fish is loaded into new type trolleys which contain 10 hollow aluminum shelves. These can be compressed over the packs by means of hydraulic pressure in order to avoid the kind of distortion that occurs when small rectangular packs are subjected to air blast freezing.

"Handling and Chilling of Fresh Fish on Vessels at Sea," by F. Bramsnaes, article, FAO Fisheries Bulletin, vol. X, no. 1, January-March 1957, pp. 25-41, illus., printed, single copy 30 U.S. cents. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.) This report is intended to cover the scientific and industrial progress made since the FAO Meeting on Herring Technology, held in Bergen, Norway, in 1950, in the field of handling and chilling of fresh fish. It discusses the experimental work being conducted on the influence of temperatures on keeping time, handling of fish at sea, exposure on deck, gutting of fish, washing on board, ways of chilling, losses of protein in stowage, storage limits, bilgy odors, functions of ice, salt-water ice, storage in chilled sea water, and preservatives. A section on progress in the industry discusses washing fish on deck and hold construction.

"Refrigeration and Modern Storage Processes for Foodstuffs. III(1). Sterilization of Foodstuffs by Means of Irradiation" (El frio y los metodos modernos en la conservacion de alimentos. III.

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Esterilizacion de los alimentos por radiacion), by A. Santos Ruiz and J. Moreno Calvo, article, *Revista del Frio*, no. 3, July-September 1956, pp. 181-188, printed in Spanish. Centro Experimental del Frio, Serrano 150, Madrid, Spain. Discusses a study of the treatment of foods by radiant energy, which has been recommended in recent years for food sterilization. Also includes a general bibliography.

SCALLOPS:

"Scallops--and Scallop Dredges," and "New Type Dredge is Far More Effective," by James Mason and R.H. Baird, respectively, articles, *World Fishing*, vol. 6, no. 4, April 1957, pp. 35-39, illus., printed. John Trundell, Ltd., Temple Chambers, Temple Ave., London, E.C.4, England. The first article is abstracted from *Scottish Fisheries Bulletin* No. 6, January 1957, published by the Fisheries Division, Scottish Home Department. It describes the life history of the scallop in detail and discusses the existing fishery in Scotland and the Isle of Man. The second article is based on a paper from the *Journal du Conseil International pour l'Exploration de la Mer*, vol. XV, no. 3, 1955, from which the drawings were also taken. It describes the new, more efficient type of scallop dredge which was developed after careful research by the Ministry of Fisheries. In terms of catches, the gear described here has proved itself, after test hauls on various grounds, three times as efficient as the standard scallop dredge.

SEAWEEDS:

How to Know the Seaweeds, by E. Yale Dawson, 203 pp., illus., printed, spiral bound \$2.25. Wm. C. Brown Co., Dubuque, Iowa, 1956.

SHAD:

The Shad in Virginia Waters, by W. H. Massmann and Robert S. Bailey, Contributions from the Virginia Fisheries Laboratory, No. 60, 4 pp., illus., printed. (Reprinted from *Virginia Wildlife*, April 1956, pp. 1-4.) Virginia Fisheries Laboratory, Gloucester Point, Va.

SHRIMP:

Protective Coloration and Habitat of the Shrimp TOZEUMA CAROLINENSIS Kingsley (Caridae: Hippolytidae), by Gilbert L. Voss, Contribution No. 172 from The Marine Laboratory, University of Miami, 5 pp., illus., printed. (Reprinted from *Bulletin of Marine Science of the Gulf and Caribbean*, vol. 6, no. 4, December 1956, pp. 359-363.) The Marine Laboratory, University of Miami, Coral Gables 34, Fla.

SPINY LOBSTER:

A Pseudosquilla Stage in the Larval Development of the Spiny Lobster, PANULIRUS ARGUS (Latreille), from Puerto Rico, by Carmelo Peliciano, Contribution No. 171 from The Marine Laboratory, University of Miami, 4 pp., illus., printed. (Reprinted from *Bulletin of Marine Science of the Gulf and Caribbean*, vol. 6, no. 4, December 1956, pp. 341-345.) The Marine Laboratory, University of Miami, Coral Gables 34, Fla.

SPONGES:

Sponge Cultivation, by F. G. Walton Smith, Special Service Bulletin no. 3, 5 pp., processed.

Marine Laboratory, University of Miami, Coral Gables, Fla., December 1948.

The Sponge Industry of Florida, by John F. Storr, Florida State Board of Conservation, Educational Series No. 9, 29 pp., illus., printed. Director of Conservation, State Board of Conservation, Tallahassee, Fla., 1957. A clearly written booklet which describes feeding and reproduction and other phases of the life of the sponge. Also discusses many parts of the sponge industry, including such topics as: where sponges are found and how they are gathered, cleaned, and sold; the value of the sponge industry; repopulation of sponge beds; and investigations to assist the sponge industry.

TILAPIA:

"The Tilapias and Their Culture, A Second Review and Bibliography," by Pierre Chimits, article, *FAO Fisheries Bulletin*, vol. X, no. 1, January-March 1957, pp. 1-24, illus., printed, single copy 30 U.S. cents. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.) A supplement to the author's first article, "The Tilapias and Their Culture, A Preliminary Bibliography" (*FAO Fisheries Bulletin*, 1955, vol. 8, no. 1, pp. 1-33). Additional information is given on all three chapters of the original article, and there is a fourth chapter, concerning barrier-lakes and artificial reservoirs that have been stocked with tilapia, using a technique which is half-way between that used for open waters and that adopted for pond culture. There is also a brief fifth chapter on the use of tilapia for other purposes.

TRADE AGREEMENTS:

Trade Agreements Manual, second edition, 49 pp., processed. United States Tariff Commission, Washington 25, D.C., March 1957. A summary of selected data relating to the various trade agreements that the United States has entered into under the authority of the Trade Agreements Act of 1934 and the subsequent extensions of that authority. Part I of the manual considers United States trade-agreement obligations, past and present. This part includes, among other things, a list of the countries with which the United States had trade-agreement obligations in effect on March 1, 1957; a master list of all agreements that the United States has concluded under the Trade Agreements Act, whether or not those agreements are still in force; and a brief legislative history of the trade agreements program. Part II is devoted to information about the General Agreement on Tariffs and Trade. This part includes, among other things, a list of the countries that were contracting parties to the General Agreement on March 1, 1957; a master list of all accessions to, and withdrawals from, the General Agreement between October 30, 1947, and March 1, 1957, and a list of the conferences and sessions pertaining to the General Agreement that have been held since 1947.

TRADE LISTS:

The Office of Intelligence and Services, Bureau of Foreign Commerce, U.S. Department of Commerce, Washington 25, D.C., has published the

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following mimeographed trade lists. Copies of these lists may be obtained by firms in the United States from that office or from Department of Commerce field offices at \$2 each.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, Producers, Refiners, and Exporters, Belgium, 9 pp. (February 1957). Lists the name and address, size of firm, and type of product handled by each firm. Includes firms dealing in marine-animal oils.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, Producers, Refiners, and Exporters, Brazil, 35 pp. (February 1957). Lists the name and address, size of firm, and type of product handled by each firm. Includes firms dealing in fish and fish-liver oils.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, and Producers, Colombia, 16 pp. (February 1957). Lists the name and address, size of firm, and type of product handled by each firm. Includes a brief summary of Colombia's imports of marine-animal oils for 1955. Firms dealing in fish and marine-animal oils are listed.

UNITED KINGDOM:

Report on the British Fishing Industry, Distant Water Trawlers, 1956, 40 pp., illus., printed. The British Trawlers' Federation (Distant Water Section), Hull, England. A report on Britain's distant-water fleet in 1956, stating that "The past year has again been one of progress for the British Fishing Industry's Distant Water Fleets sailing from Hull, Grimsby and Fleetwood. Landings, human consumption, and earnings all increased in spite of atrocious weather on the Arctic fishing grounds during the last quarter of the year. Unfortunately, operating costs also rose very steeply and in view of this and of the scarce supplies due to bad weather at the end of the year, it was

a remarkable achievement in the public interest that the average over-all price at the quayside went up by less than a farthing (about 0.3 cents) a lb. The increased landings were achieved with fewer trawlers, great progress having been made in the modernization of the Fleet and the replacement of obsolete vessels by highly efficient new ships." The report also states that "Great progress was also made in achieving safety at sea. The year was notable for the fact that not a single trawlerman lost his life as a result of shipwrecks. The fact that only two ships were lost in spite of appalling weather may well have been due to a combination of more modern and efficient ships with more up-to-date navigational aids and the maintenance of extremely high standards of seamanship. The fact that no lives were lost in the two shipwrecks was undoubtedly due to the introduction of inflatable rubber liferafts, which were responsible for saving 57 lives. These have now been made compulsory and will replace lifeboats."

VIRGINIA:

History of Virginia's Commercial Fisheries, by J. L. McHugh and Robert S. Bailey, Contributions from the Virginia Fisheries Laboratory, No. 70, 23 pp., illus., printed. (Reprinted from The Virginia Journal of Science, vol. 8, no. 1, January 1957, pp. 42-64.) Virginia Fisheries Laboratory, Gloucester Point, Va.

Oyster Yields in Virginia, by J. L. McHugh and J. D. Andrews, Contributions from the Virginia Fisheries Laboratory, No. 55, 6 pp., illus., printed. (Reprinted from *Southern Fisherman*, August 1955.) Virginia Fisheries Laboratory, Gloucester Point, Va.

WHALES:

Here Come the Whales! by Alice E. Goudey, 94 pp., illus., printed, \$2.50. Charles Scribner's Sons, New York, N. Y., 1956.



FISH STICKS--A VERSATILE FOOD

When you want an economical, convenient, and versatile food to appease hot-weather appetites, golden-fried fish sticks are the answer. They may be served for breakfast with scrambled eggs; luncheon with a tossed salad; snack time with a glass of milk; dinner as the main dish of the meal; midnight supper with crisp potato chips and a tempting beverage; or as a hot appetizer for an easily prepared hors d'oeuvre tray.

These oblong sticks of skinned, boned, breaded, precooked, and frozen fish of several varieties are one of the most popular fish items on the market. This versatile food is also rated tops among the convenience foods as they are handy to store in the freezer, easy to prepare, and yet nutritious and delicious.

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BLUEFIN TUNA SPAWN OFF SOUTH FLORIDA

The occurrence of recently-spawning fish and eggs and larvae believed to be those of the bluefin tuna suggest that these fish spawn in the Straits of Florida during May and early June. The main spawning area appears to be on the outer margin of the Florida current between Riding Rocks and Bimini in the Bahamas. The spawning habits of the smaller tuna in the area are at present unknown. The evidence suggests that the American and European tuna represent independent units inasmuch as the spawning time overlaps and the areas of spawning are about 4,000 miles apart.

--Sea Secrets, The Marine Laboratory,
University of Miami, Coral Gables, Fla.

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Pp. 1, 4, 5, 6, 7--North Pacific Fisheries Exploration and Gear Research, Exploratory Fishing and Gear Development Section, Bureau of Commercial Fisheries, Seattle, Wash.; p. 15--Fred W. Hipkins; pp. 26-27--F. B. Sanford; pp. 57, 58, 59, and 60--Nick Knezic, San Pedro, Calif.; outside back cover, fig. 1--R. P. Elliott.

THE DUNGENESS CRAB INDUSTRY

Fishery Leaflet 439 (The Dungeness Crab Industry) describes the Dungeness or the Pacific crab, the fishery, processing methods, and marketing.

In the section on Marketing the author states that:

"Dungeness crab is marketed in three different forms: (1) whole crab, fresh or frozen, (2) fresh or frozen meat, and (3) canned meat. Nearly 85 percent of the total catch is marketed



FIG. 1 - DUNGENESS CRAB.

fresh and frozen, either as whole crab or as picked meat, in States west of the Rocky Mountains, particularly in the Pacific Coast States. Nearly all the crabs landed in California, the largest marketing area on the Pacific Coast, go to the fresh-market trade. Fresh-crab shippers in Oregon and Washington also supply the California market. A few individually packaged and frozen whole crabs are marketed in the Midwestern States as well as in some of the large eastern cities. Canned Dungeness crab meat is offered for sale throughout the United States.

"Before 1920, Dungeness crab was marketed in one form only--freshly-cooked whole crab. Up to that time, the domestic canned crab meat market was completely dominated by foreign crab meat, mainly from Japan. Domestic producers, lacking a good formula, were skeptical about canning the meat and felt that they

could not compete with foreign producers. For several years before 1920, trade journals strongly emphasized that Dungeness crab meat had a flavor superior to foreign canned crab meat and had urged the crab industry to start canning Dungeness crab. It is claimed that a canning formula was borrowed from Japan, and with the encouragement of a trade journal, Dungeness crab meat was first canned in Alaska in 1920, and in Washington and Oregon in 1927.

"The small Alaska pack of 75 cases in 1920 was a success, and the industry in Alaska quickly expanded. Cannery workers were quick to enter this new field because it afforded off-season employment to cannery workers and fishermen. In 1948 a record pack of 169,798 cases of Dungeness meat, valued at \$3,820,622, was produced by the entire industry. This amount represented about 30 percent of the crabs landed that year, while the remaining 70 percent was marketed fresh or frozen as either whole crabs or picked meat.

"In recent years, the production of canned crab meat has declined. Two factors have caused a reduction in the production of heat-processed canned crab meat: (1) the demand for fresh and frozen crab has steadily increased, and (2) increased production and importation of canned crab meat, mainly from king crabs, have caused the domestic industry to proceed cautiously."



FIG. 2 - BARGE TRANSPORTING CRAB POTS TO SOUTHEASTERN ALASKA.

Free copies of FL 439 may be obtained from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C. Additional information on the processing and canning crab may be found in Fishery Leaflets 85, 88, and 374 and Separate No. 50.

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